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DOWNTOWN WATERFRONT FANEUIL HALL PROJECT

MASS. R-77

LONG WHARF FOUNDATION STUDY

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Prepared By:

Schoenfeld Associates, Inc.
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Boston, Massachusetts 02111

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A. PURPOSE OF REPORT

This Report is bascially a foundation report for Long Wharf. It is intended to be used by the Boston Redevelopment Authority in their development of the area. Existing known foundation data has been included, problem areas have been identified and recommendations have been made. Estimated costs have been developed to aid the developer in selecting the treatment and future development of the site. The following assumptions were used in preparing this Report:

1. The Quincy Market building foundation is to remain intact and used as the foundation of the new hotel.
2. The seawall lines are to remain constant and no major new seawall work is proposed.
3. The hollow deck at the east end of the Wharf is to be rebuilt.
4. No new deck or seawall piles are proposed on the site. Existing piles will be utilized wherever possible.
5. The Chart House Restaurant and the Custom House Building are to remain.
6. All outer piers and decks are to be repaired, not constructed new.

Total costs of the foundation work can be determined when the Boston Redevelopment Authority selects the appropriate alternatives it wishes to adopt. The Recommendation section of this Report is intended to aid in the determination of final concepts.

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B. A BRIEF HISTORY OF THE SITE

In 1673 a group of Boston citizens, 41 in all, signed an agreement with the town selectmen to build a sea wall on the mud flats of the town cove. The wall was slightly above, and roughly parallel to, low water mark at that time, and ran almost on the line of the present Atlantic Avenue, leaving between it and the town waterfront a broad, shallow cove which was always dry at low water. The wall was 2200 feet long, 22 feet thick, and about 6 feet above high water level, or 15 feet above the mud, with additional height planned for a gun battery. Two 75 foot gaps were left in the wall for passage of vessels in and out of the cove. The details of construction are uncertain, but call for wood and stone.

The proprietors were given full profits from dockage at the wall, and were allowed to build warehouses and wharves for a width of 200 feet on the inshore side of it. The town, at the same time, had a defence against attack by sea, which was then a threat from both Holland and France.

The proprietors, however, allowed the wall to fall into disrepair, which was speeded by a practice recorded in the town records of 1708:

> Yet it is presumed that the principall cause of the Sd wharfe so soon brought to Ruine and the Owners thereof thereby made so great Sufferers was, that ye Sd wharves lying remote from the Owners' Inspection, It became a common practice for boats and other vessels (in the Night) to take ballast from ye Sd Wharves and so special severity in the Law provided to deterr Ill persons from Such practices, which in that day was expected would have been provided for the preventing So great and Publick a Mischief. But the consequence was that after so much of the stones were So taken away ye Sd wharves Could no longer be defended from the force and Violence of Storms.

By 1727 the wall was almost destroyed. The selectmen investigated it, but found it beyond practical repair, and since it had served little

purpose up until then, it was allowed to deteriorate completely. By 1750 only the foundations were visible, and before long it disappeared altogether.

In 1708, however, the selectmen met in an effort to find some solution for the decay of the wall. After a series of hearings, they proposed that King Street be continued in a straight line to the Barricado, and thence to low water mark, as a wharf the width of the street. This would make the insular middle section of the wall accessible without lighters, and therefore more easily maintainable. It was specified that the wharf should be left open 30 feet of its width for its full length, as a public way for carts and pedestrians. The eastern tip, wider than the rest of the wharf, was to be left open for a gun battery, which incidentally was never completed. The wharf had to be left open its entire width from the base of King Street to the "Circular line", a distance of 120 feet.

The Circular line was an arc drawn in 1708 to trace a semicircle of about 1000 feet radius inside the Barricado. It ran roughly parallel to the shore line, but somewhat to seaward of it, and was used for apportioning rights in the semicircular cove. In 1708 it roughly skirted the tips of the various small piers along the edge of the cove. The line would intersect State Street today at Chatham Row, but as the harbor was filled in it became useless and was soon forgotten.

In 1709 Oliver Noyes and five other men offered to build and maintain such a wharf at their own expense, and an agreement was signed with the selectmen, granting the proprietors the right to occupy the land "forever". They agreed to

> Erect, build, and maintain a Wharffe the width of King Street...in a direct line to the Wharffes commonly called the New Wharves (Barricado) and unto Low Water mark, leaving always a way 30 feet wide on one of the sides thereof, as a high way for the use of the Inhabitants of Sd. Town

> and others, And to Extend from one end of the same unto the other forever and leaving a Gap 16 feet wide (covered over) for Lighters and Boats to pass and repass about the Middle of the Sd Wharffe or where the Selectmen Shall Direct and also a passageway on the New Wharves, on each side for Carts etc., leaving the end of said Wharffe Free for the Town when they shall see reason to Plant Guns for the Defence of the Sd Town.

It is questionable whether the town had the right to grant as long a wharf as they did. In 1647, by a Colonial Ordinance, an owner of shore line was granted the flats in front of his land for a distance of 100 rods (1650 feet) from high water mark. According to a survey map of 1846, the original high water mark crossed State Street at Merchants Row, and 100 rods to seaward is the westerly end of the Custom House Block.

It is my opinion that the selectmen intentionally ignored the 1647 ordinance, fearing that there would be nobody willing to undertake the cost of the wharf unless given the right to build a substantial segment outside the Barricado. A wharf kept within the 1647 limit would not allow room to easily dock seagoing vessels, which were until then usually unable to enter the cove, and had to be loaded by lighters. Only smaller vessels could be accommodated on a short outside extension. Furthermore, as each low tide approached, traffic in the shallow cove slowed considerably, but with a sufficient extension onto the lower flats there would be water enough to maneuver vessels until nearly low water.

This limitation was ignored, however, and construction was begun in 1710, continuing until 1712. Various debris from the great fire of 1712 were used in the construction, and later found and dated. The town citizens were somewhat jealous of the proprietors' privilege to build out to the harbor, and in July 1712 they were cautioned at a town meeting not to exceed the limits of their grant from the selectmen. The town citizens clearly wanted only connection to the Barricado, and were not interested in a private

group building out any further.

The details of the original structure are uncertain, but a few are known, and others are probable. The wharf was 55 feet wide and 2200 feet long, with a T at the tip 150 feet in width and 70 feet in length. The builders first laid border walls of granite blocks, shipped from Rockport or Quincy. The granite walls rested on large oak pilings, which had been driven in close parallel rows under the line of the wall, until the heads of the piles were just below the mud surface. This prevented air from reaching them, and they are there today, perfectly preserved. An alternative to piling was to drop a layer of blocks, let it settle in the mud for a few months, then add more layers, pause, and so continue until the wall had naturally "found" its own firm bed. However, this was time-consuming, and not always successful, so it is unlikely that this method was used.

How was it built

The granite wall was then reinforced with a series of pilings along its side, to prevent any of the blocks from becoming dislodged. In the middle of the wharf fill was dumped and tamped until a firm surface had been made, which was then paved with stones and prepared for the construction of warehouses. Most of the houses originally built were small enough not to need piling foundations, but when a warehouse of considerable weight was planned, piles were driven. The fill in the wharf has heaved and fallen constantly, and only a light, durable building could stand the fluctuations.

The wharves were generally built with a wooden shelf 5 to 10 feet wide around the edge, the same level as the wharf pavement, against which ships could berth. It was a solid structure, supported by piles, with several of them protruding above the surface for belaying lines.

The wharf was divided into two divisions, separated at the Barricado.

In the upper division the buildings were uniform, 20 feet in width, and divided equally among 24 proprietors. The lower division was divided by lots among the same proprietors, who built what suited them, or leased the lot.

Besides warehouses there were many different establishments, including shops, offices, fish companies, sail and rigging lofts, and the inevitable tavern. The wharf was continually a busy place, since most of the city's imports and exports were loaded there. Fat British cargo vessels continually lined the edge, with their yards hanging over the alley, and their cargoes heaped on the wharf. It was obvious that the wharf was Boston's highway to the rest of the world.

The management of the wharf was, understandably, uneventful. The most extreme stand the proprietors made for decades was, "No Vessells Except sloops shall lye on the North side of the wharf, neither shall any Ship or Briggantine come to any warehouse on that side." No reason is given, but presumably there was insufficient loading space with only 5 feet between the buildings and the edge. The yards of larger ships would also be likely to strike the buildings as they rode to a swell. The rest of the time was spent tending to maintenance, censure of any proprietor who became, in one way or another, a "nuisance", wharfage, dockage, and a running dispute with the town as to who should light the lamps on the "public way" along the wharf. The proprietors did show frugality, though, when in 1740 a keg of molasses was dropped from a sling and busted. Painfully trivial as it was, they went to great pains to prove that the wharf's crane was not faulty, but that the British sailor using it needed a lesson in rigging.

The area around the wharf was dredged gradually, although this was never recorded precisely. The slips beside the wharf probably went first,

followed by more and more of the surrounding cove. At the same time, other wharves were extending into the cove to the north of Long, at the present site of Commercial Wharf. These can be seen in a Paul Revere print of 1768, showing the British occupation troops landing on Long Wharf.

The wharf itself underwent rebuilding in 1767, when the T at the tip was widened by 30 feet, and lengthened east to west by 15 feet. A gentleman named Soper contracted to do the job for 2153 pounds, of which three-fifths was allotted to materials alone. He began, of course, by sinking an outer wall, but managed to put it in the wrong place. The concerned proprietors met with him one morning, and as the tide happened to be low they took a walk down to view the work. As the minutes record it,

> They took notice of the work that had been finished, and were surprised to see how badly the work was performed, and with what unsuitable stones the wall was built, inasmuch that it appeared doubtful whether it would stand long.

Mr. Soper had also ordered a gross excess of fill, probably to his own profit, and the contract was broken forthwith. It is comforting to know that inept builders are nothing new.

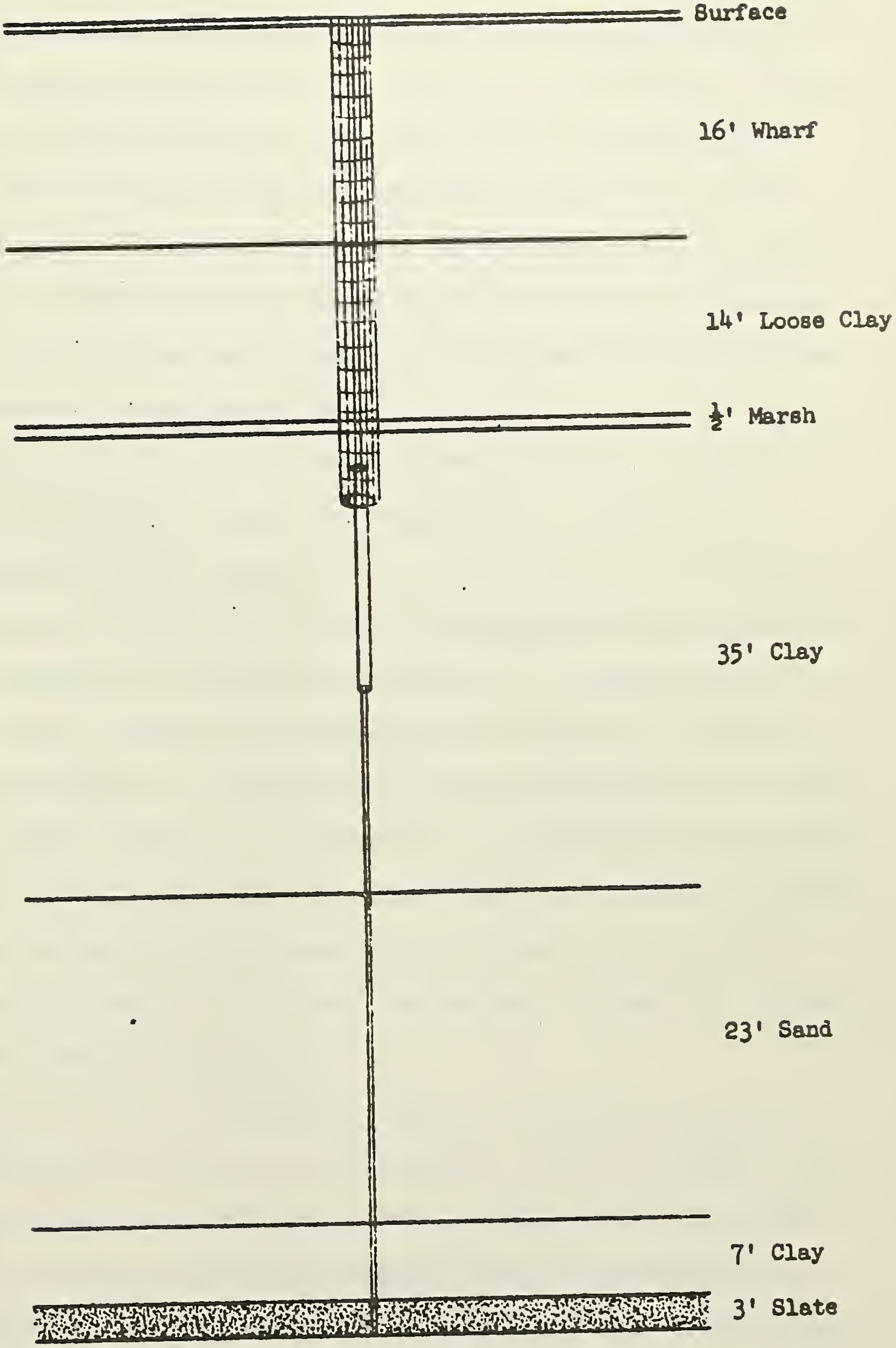
While the Revolution dragged on in the colonies, the proprietors did not mix politics and business. The only sign of the war in their minutes is that the name of their customary meeting place was changed from British Coffee House to American Coffee House. It is almost certain that during this time they were suffering financial losses. These were not reflected until 1779, when the directors of the then incorporated group petitioned to the selectmen for a lottery because, "By various means and several late Violent storms, the said wharf has suffer'd unspeakable damage, and is now almost, and will soon be quite rendered useless and destroyed." Also mentioned as a cause was "this late grievous and unjust War", which, being the only anti-British avowal in the records, shows restraint for a group headed by John Hancock.

The lottery was finally allowed, since the wharf was considered an asset to the town and the Navy. It was held in 1780, and while it cost the corporation $1,500 it earned them $370,000, which was presumably used to repair the wharf.

An interesting enterprise, boring a well on the wharf, was undertaken in 1797, at the present intersection with Atlantic Avenue. The wharfinger recorded it as follows:

> The depth of the well is 35 feet. From the bottom of the well to the spring is 62 feet, making 97 feet from the top of the well to the spring. The inside curb which forms the well is four feet in diameter on the inside and perfectly tight at the bottom. In digging the well from the platform which now covers it, we dug through the wharf about 16 feet; from thence through the flats 14 feet. We then came to a marsh of 6 inches thickness, under which was pure clay. We dug into this clay about 4½ feet, and then put down the inside curb. In boring for the fresh water we proceeded as follows: -
>
> We first made a hole in the bottom of the curb of 10½ inches diameter; then bored into the clay 8 feet with an auger 10 inches diameter. We then took a log 15 feet long and ten inches diameter with a hole through it of five inches diameter which log we put into the hole at bottom of the curb and drove it with a large weight 13 feet, leaving 2 feet above the bottom of the curb; then with an auger 5 inches diameter bored through the hollow log 35 feet from the bottom of the well through pure clay. We then came to sand from which we had a small quantity of fresh water. Through this sand we bored about 23 feet and then came to pure clay. We bored through this clay about 7 feet and came to a hard pan of slate and on taking up the auger found the water to rise fast. We then put a hollow tube of 4½ inches diameter into the hole we had bored, which hollow tube extends from the bottom of the well to the hard pan of slate. We then fixed a drill on the shank of the auger and let it down through the hollow tube and drilled into the hard pan bottom about 3 feet. We found we had struck a spring affording an abundant supply of water.

The construction of the well took three months, but offered fresh water right at a ship's side. It was a good investment, paying about $2,000 annually, but it was covered at some unknown date, and there is no trace of it today.


Surface
16' Wharf
14' Loose Clay
½' Marsh
35' Clay
23' Sand
7' Clay
3' Slate

The nineteenth century produced a magnificent waterfront in Boston, with modern and ambitious projects sprouting all around Long Wharf. Uriah Cotting's leadership was responsible for Central and India wharves stretching out to the harbor shortly after the War of 1812. The large granite warehouses far surpassed anything that Long Wharf had to offer, and they created an impressive section of the cove. At the head of the slip between Central and Long stood the Custom House, in the middle of a broad cobbled square. On this site the present granite structure was built in 1838, and the tower built on top of that in 1913.

To the north of Long Wharf, between Faneuil Hall and the sea lay a seamy, unattractive area of small piers and alleys. In 1825, however, Mayor Josiah Quincy led a project to fill in the shore out to the present Commercial Street. On this land he built Quincy Market and two flanking warehouses, forming a very handsome harborside in the central cove.

Long Wharf, already over a century old, was hard put to keep pace with these improvements. An additional 50 feet of width was added to the south side in 1824. The tip of the wharf was also enlarged again, becoming 224 feet x 130 feet, with a block of stores erected on it. Not until 1847, however, was any major building constructed. In that year the granite Custom House Block, which stands today, was erected, to handle the increasing business from packets and clippers.

Beginning in 1856, the lengthy slip between Long and Central was filled in piecemeal, to allow more working space at the western ends of the wharves. Although this did not amount to more than about 100 feet, half the slip was eventually filled when Atlantic Avenue was superimposed on the waterfront. This project shortened the wharves to their present length, and filled in in the cove so that, aside from street pattern, it was

indistinguishable. Long Wharf did not suffer damage to any major buildings unlike India, Central and Commercial, but the charm of the waterfront as a whole was greatly impaired.

It was during this period, the decline of deepwater sail and the rise of steam, that Long Wharf began to lose the business of ocean-going vessels. There was inadequate space for efficient cargo handling by modern methods, and the steamers generally carried larger cargoes. There was insufficient warehouse space to store these cargoes, and the architecture of the structures was outdated. Consequently, the emphasis changed to the local fishing fleet, longliners and seiners, and the dories which the North End immigrants used between Boston and Scituate.

The United Fruit Company continued to dock deepwater vessels in the south slip after most other customers had gone to South or East Boston. The grey shed which covers the south side and tip of the wharf was built by them in the 1890's, and they used it up until the beginning of World War II. As there were about 25 feet of water in the Long-Central slip, a fairly large vessel could be brought in there, and the only limitation was wharf facilities. However, this business ceased with the war, and the last large ships to be handled at the wharf were the Liberty ships, which docked there for repairs during the war.

Since then the wharf has been used by fishing companies, and by various offices and lofts. The oldest building on it is a brick structure just west of the Custom House Block. Since it is 45 feet in width, it could not have been built until 1763, when the wharf was first widened, by 20 feet on the north side. It is doubtful that it was built after the War of 1812, since larger granite buildings were called for during the subsequent period. The building alone gives one some idea of the long, narrow

string of warehouses which stretched from the heart of town out to sea.

The present waterfront, constructed to handle small sailing ships of two centuries ago, has no place in the commerce of the city. However, with thoughtful planning, the charm of the area bounded by the Custom House, Faneuil Hall, and Long Wharf may be preserved in harmony with city improvements. The ugly polyglot of buildings which were erected without pattern after Atlantic Avenue was built could be weeded out, allowing a better perspective of the more handsome and significant buildings in the area. It would be a shame, in the haste of redevelopment, to overlook, or even worse to mar, the few remaining traces of Boston's former maritime enterprise.

Records of Long Wharf

Peabody Museum, Salem:

I. Journals - 30 vols. - 1820-1822
1839-1841
1863-1920

These record the income of the Wharf from any source whatsoever, although mostly storage and dockage.

II. Ledgers - 13 vols. - 1805
1820
1863-1920

These list stockholders, shares, and dividends.

III. Income & Expenditure - 5 vols. - misc. dates.

IV. Storage - 7 vols. - 1881-1894

Gives nature of goods stored, and owners of goods.

V. Delivery Books - 8 vols. - misc. dates

Records name and type of ship, where from, where bound, cargo delivered, and dates of dockage and storage.

VI. Cash - 14 vols. - 1840-1893

Financial records. Gives income and expenditure, and dividends to various stockholders for each year.

VII. Letters - 3 vols. - 1920-1953

Copies of miscellaneous correspondence.

c/o James Bagley, 50 State Street:

Volume I. Typed, loose-leaf, containing opposing aspects of legal dispute (1845) over boundaries granted to proprietors by the town in 1710. As background material, many interesting excerpts are given from the selectmen's records, dating from 1710 to 1844. This collection gives insight into the complexity of waterfront titles, and into the wharf's relationship with the town. The dispute centered on the right of the company to move the 30 foot way to the south, in order to make room for the Custom House Block.

Volume II. Minutes of Proprietors, 1710-1781. Original. No financial records, only minutes of meetings.

Volume III. Minutes of Proprietors, 1781-1822. Also original.

Volume IV. Minutes of Directors 1822-1871.

Volume V. Minutes of Proprietors 1822-1871.

Volume VI. Minutes of Directors 1871-1924.

Volume VII. Minutes of Proprietors 1871-1940.

Volume VIII. "Records of Poston Pier, Vol. 1"
Hand-copied duplicate of proprietors' minutes 1710-1781.
Several trivial omissions.

Volume IX. "Records of Poston Pier, Vol. 2"
Same, 1781-1822, with annual financial summary.

Volume X. Deeds, 1709-1842.

✓ Volume XI. Log of Long Wharf, 1908-1915, assembled by Gilbert Payson,

wharfinger. A very interesting collection of photos, newspaper clippings, and explanations by Mr. Payson. Also a description of the wharf settling when a new building was added. For the casually interested, this is the most rewarding volume.

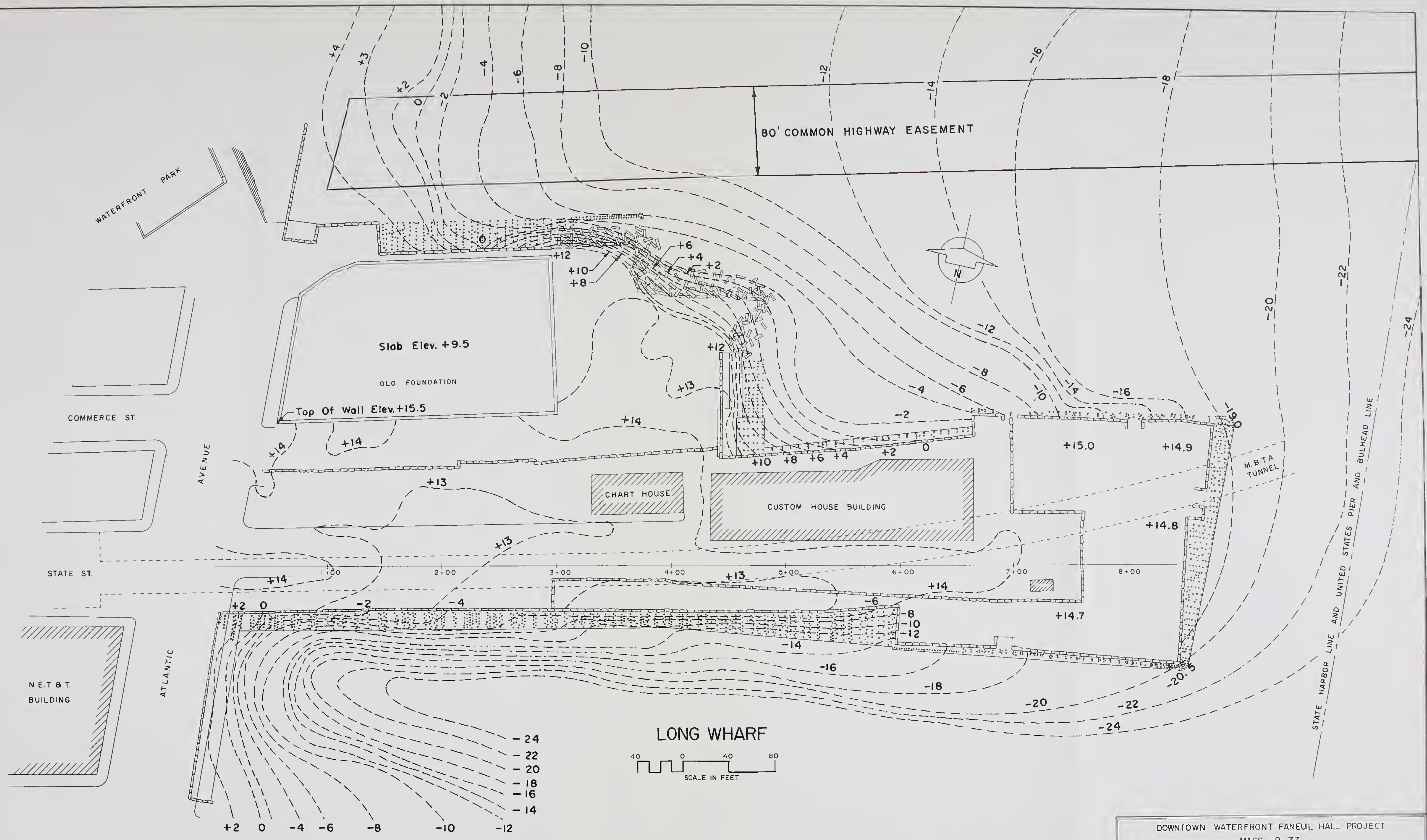
In addition to the above there are complete wharf records in several volumes for the last 40 years at 50 State Street.

The Boston Athenaeum has a collection of about 80 glass plates taken around the waterfront at various times between 1850 and 1900. Colorful and informative, they are concerned mostly with different views of Long Wharf, although many other parts of the waterfront are recorded.

C. EXISTING CONDITIONS

I. SITE PLAN

DRAWING A



NOTE: The Data Shown On This Plan Was Compiled From The Best Available Sources And Is Not Warranted To Be Correct.

All Elevations Refer To Boston City Base.

DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS R-77

SITE PLAN
LONG WHARF

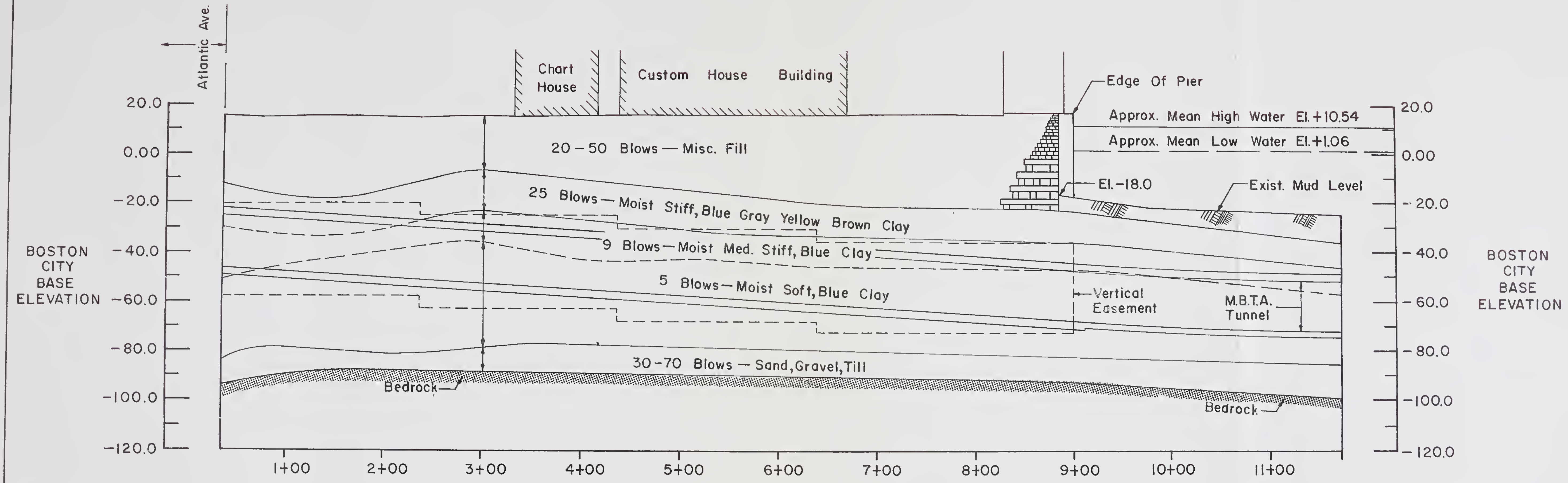
BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No A
DIR OF ENGINEERING	SCALE AS NOTED	REVISED

C. EXISTING CONDITIONS

II. EXISTING SOILS PROFILE

DRAWING B


Atlantic Ave.
Chart House
Custom House Building
Edge Of Pier
Approx. Mean High Water El.+10.54
Approx. Mean Low Water El.+1.06
El.−18.0
Exist. Mud Level
20−50 Blows — Misc. Fill
25 Blows — Moist Stiff, Blue Gray Yellow Brown Clay
9 Blows — Moist Med. Stiff, Blue Clay
5 Blows — Moist Soft, Blue Clay
Vertical Easement
M.B.T.A. Tunnel
30−70 Blows — Sand, Gravel, Till
Bedrock
Bedrock
BOSTON CITY BASE ELEVATION
BOSTON CITY BASE ELEVATION
20.0
0.00
−20.0
−40.0
−60.0
−80.0
−100.0
−120.0
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00

SOILS PROFILE THRU ℄ OF TUNNEL

SCALE: Vert.= 1" = 40'-0"
Horiz. = 1" = 100'-0"

NOTE: The Soils Information Shown On This Plan Was Compiled From The Best Available Sources And Is Not Warranted To Be Correct. See Boring Logs For Specifics.

DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS. R-77

SOILS PROFILE
LONG WHARF

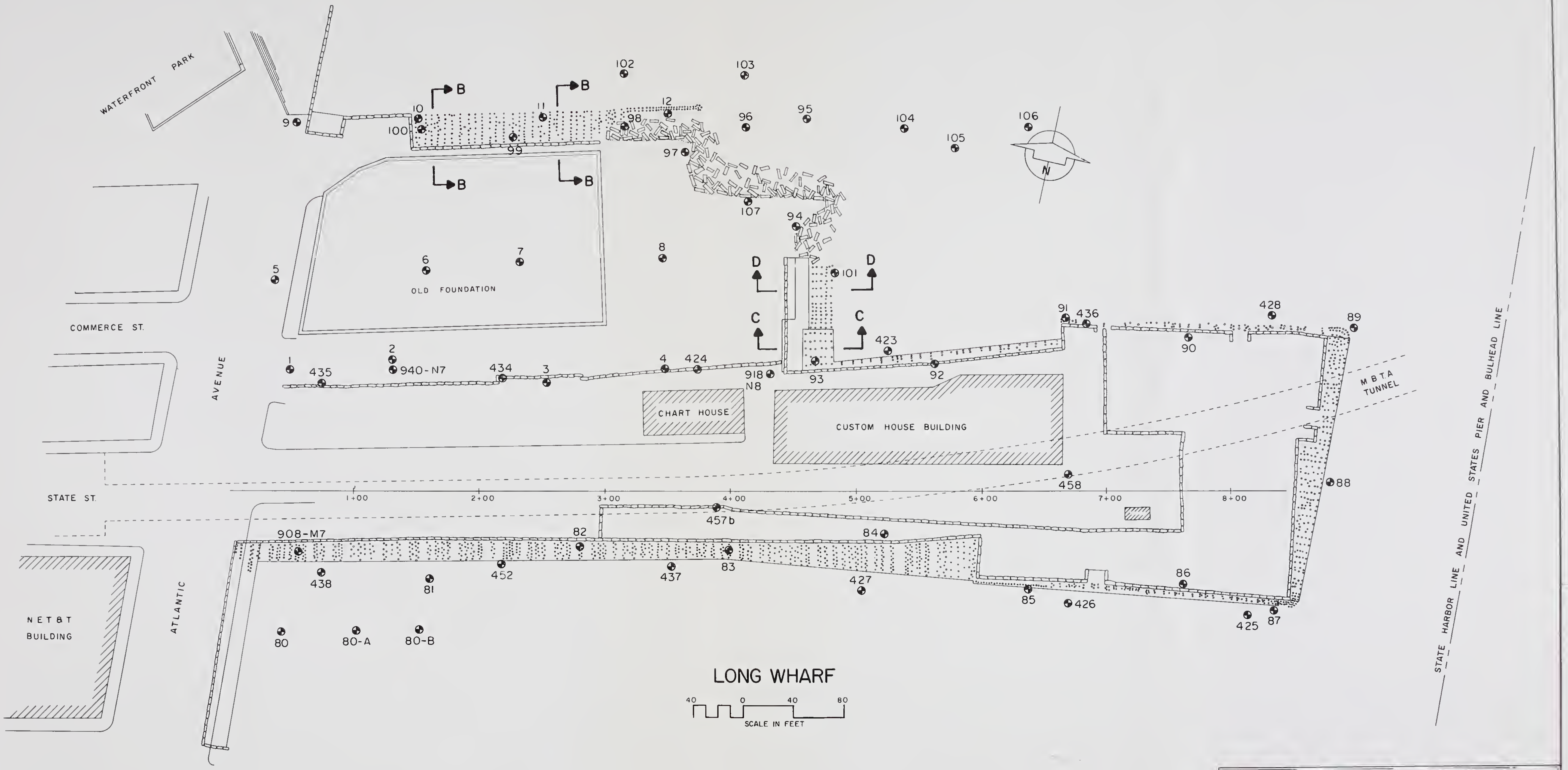
BOSTON REDEVELOPMENT AUTHORITY
BOSTON—SUFFOLK COUNTY — MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No B
DIR. OF ENGINEERING	SCALE AS NOTED	REVISED

C. EXISTING CONDITIONS

III. BORING LOCATION PLAN

DRAWING C



DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS R-77

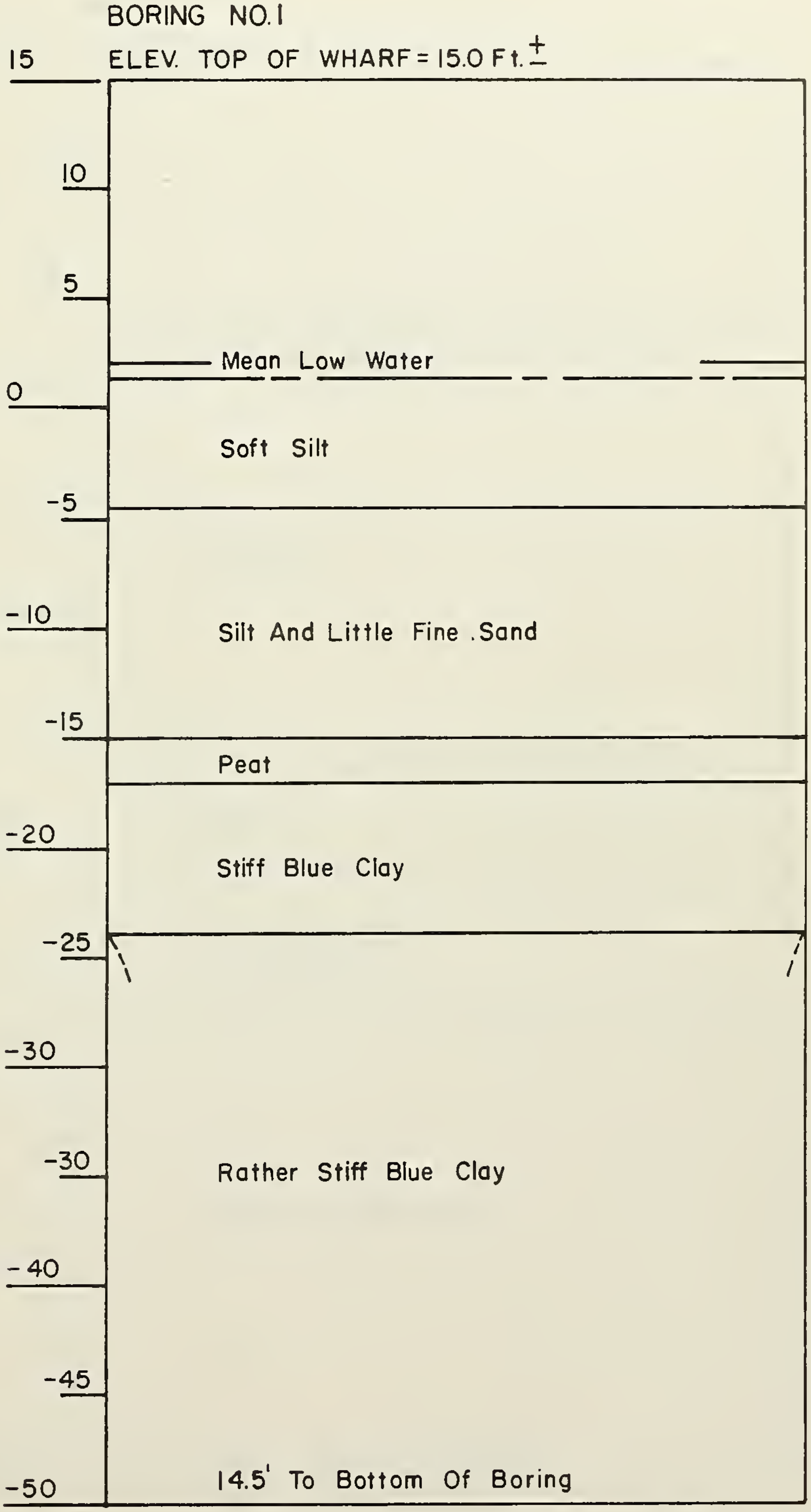
LONG WHARF
BORING LOCATION PLAN

BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No C
DIR OF ENGINEERING	SCALE AS NOTED	REVISED

Quincy Market Cold Storage & Warehouse Co., 'T' Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1" = 8'
H.S. Adams, C.E.



Quincy Market Cold Storage & Warehouse Co., "T" Wharf, Boston, Mass.

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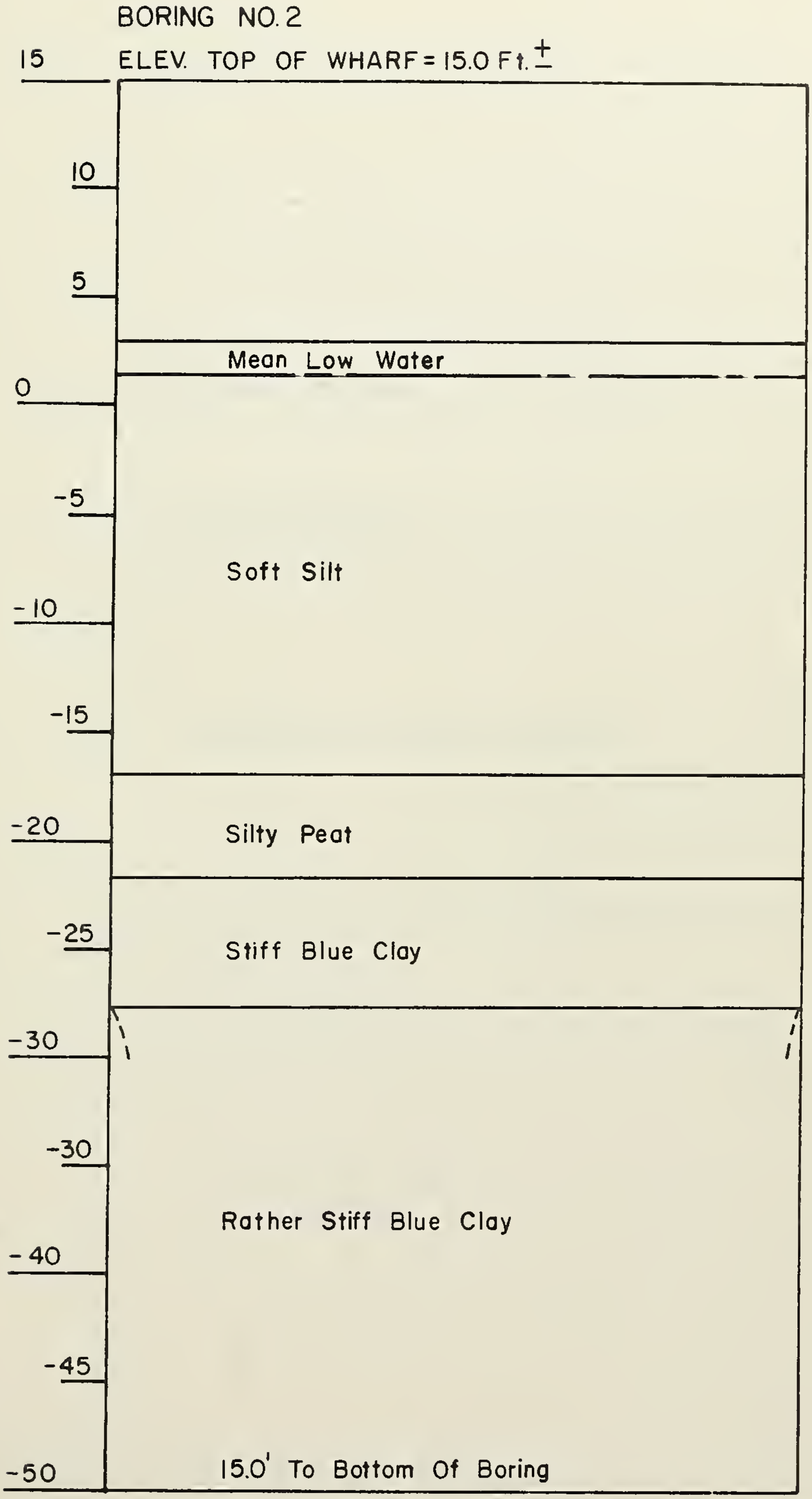
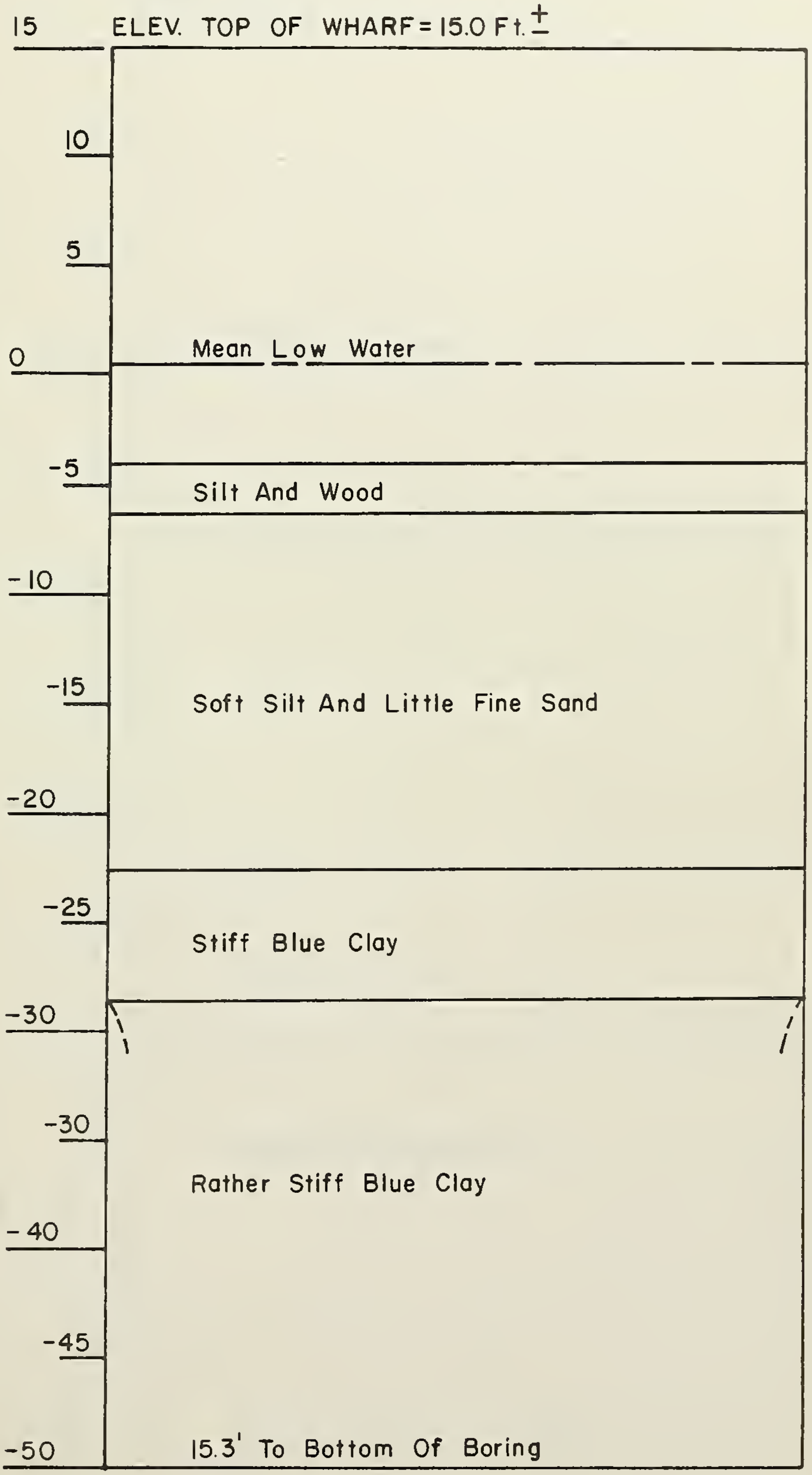
H.S. Adams, C.E.



Quincy Market Cold Storage & Warehouse Co., 'T' Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.

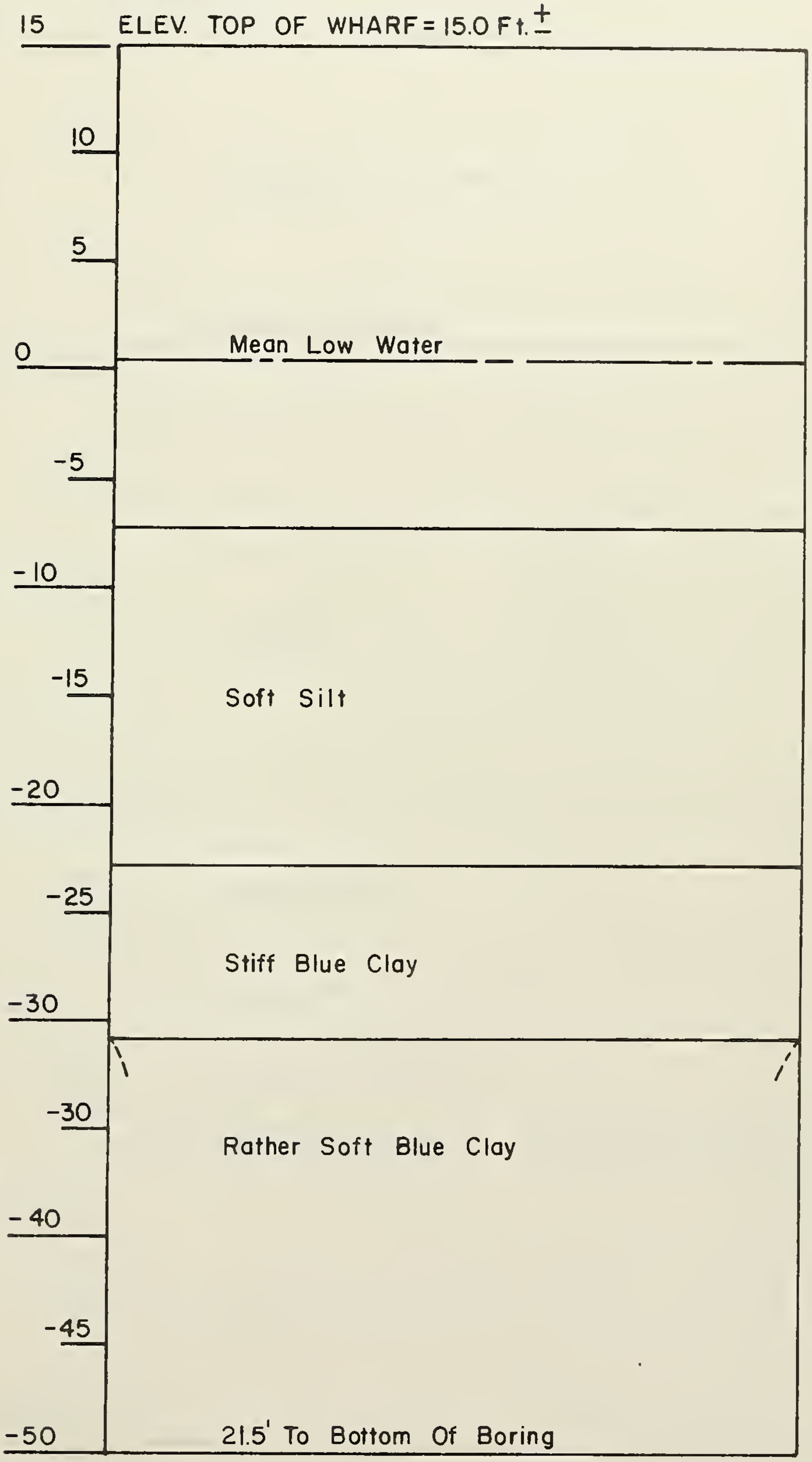
BORING NO. 3



Quincy Market Cold Storage & Warehouse Co., T Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.

BORING NO. 4



Quincy Market Cold Storage & Warehouse Co., T Wharf, Boston, Mass.

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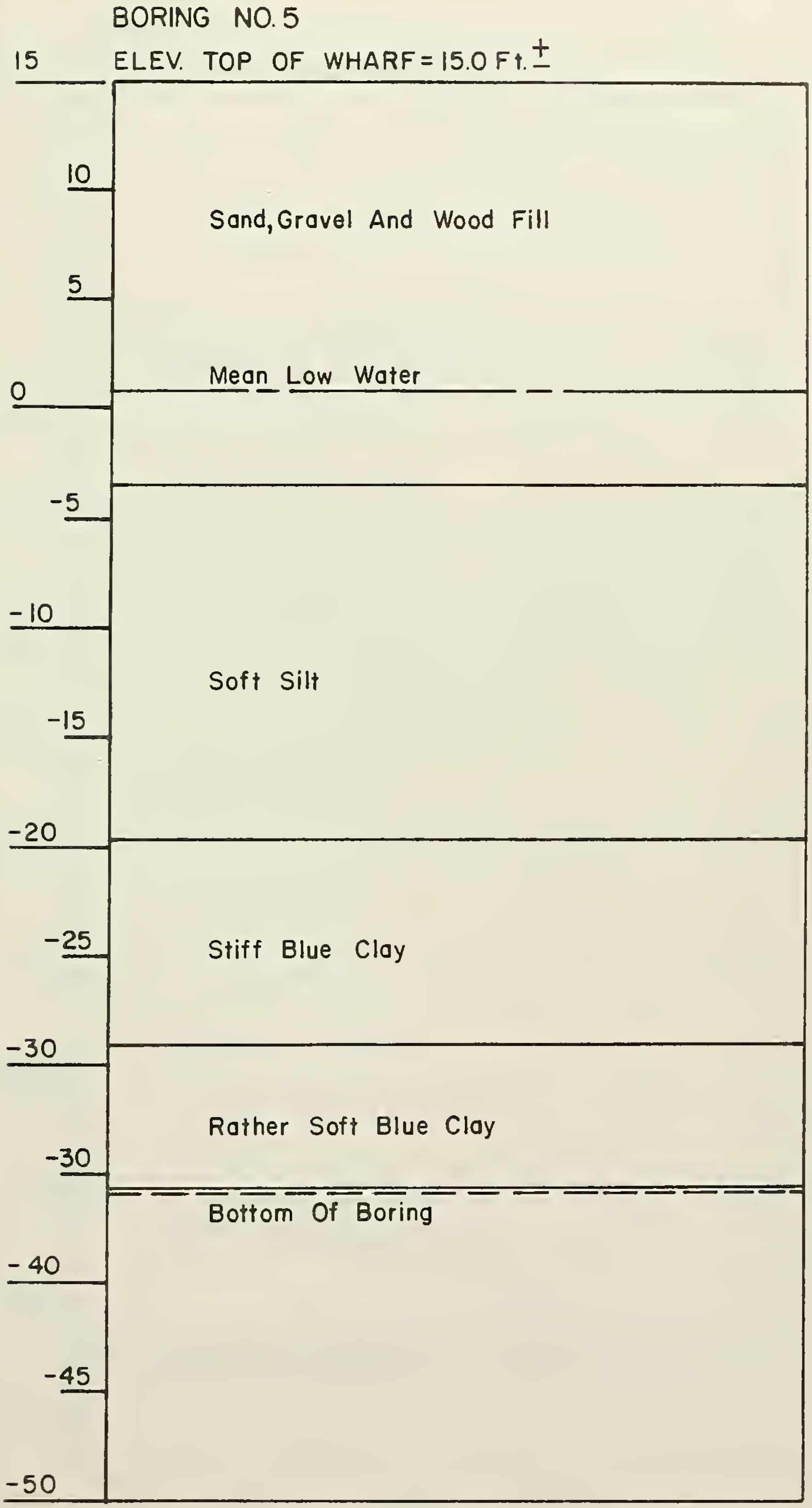

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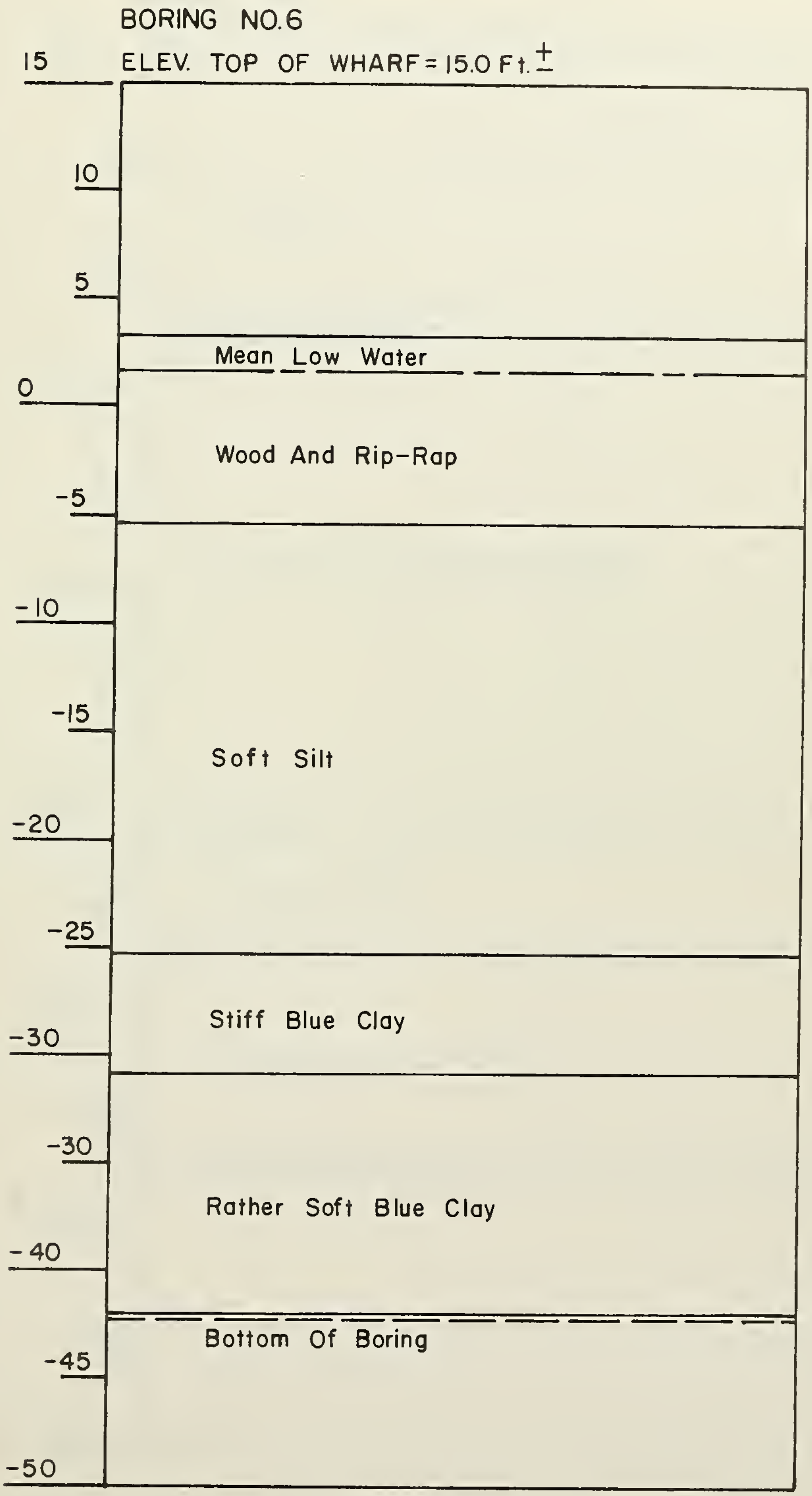
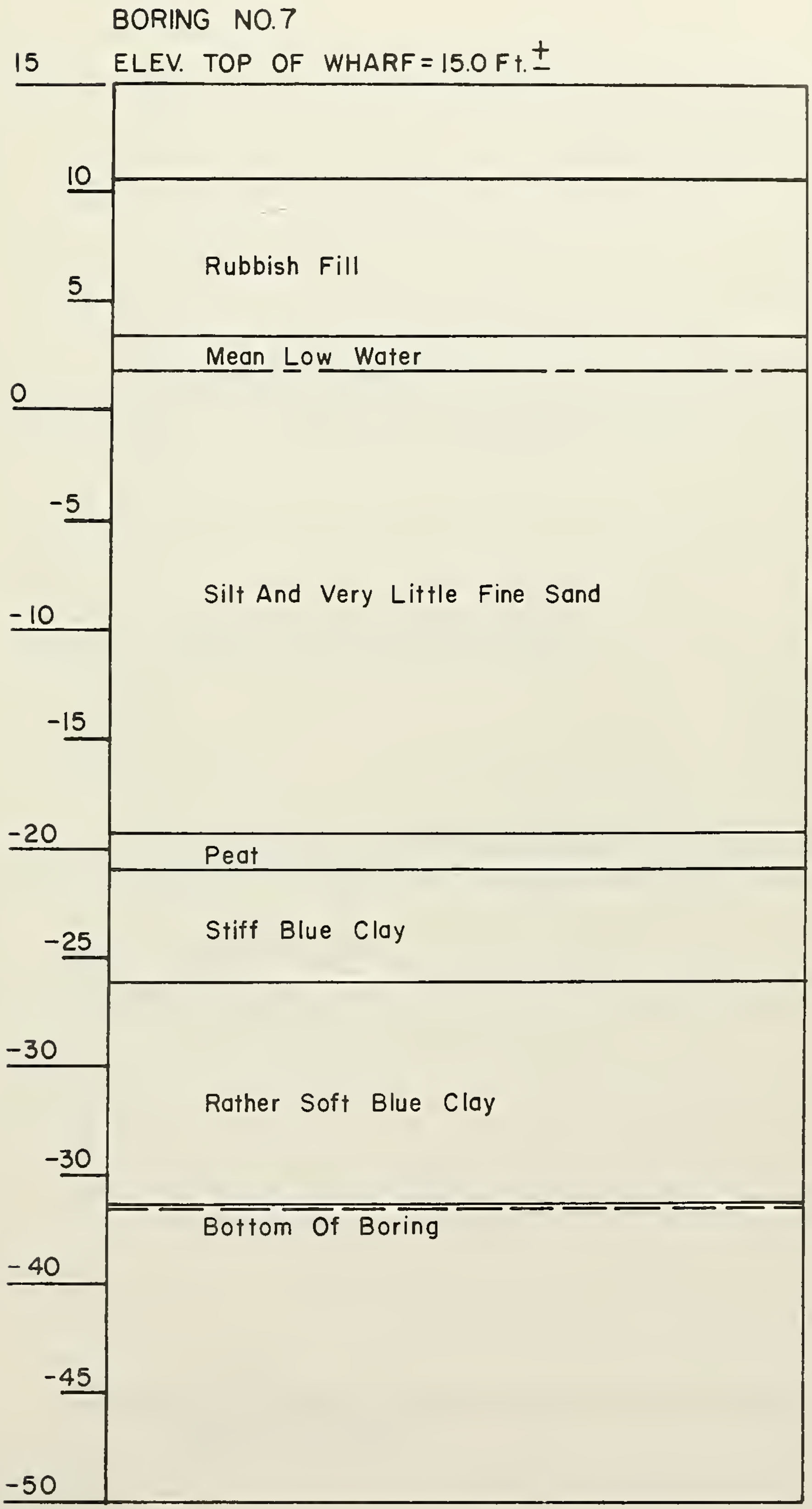
H.S. Adams, C.E.



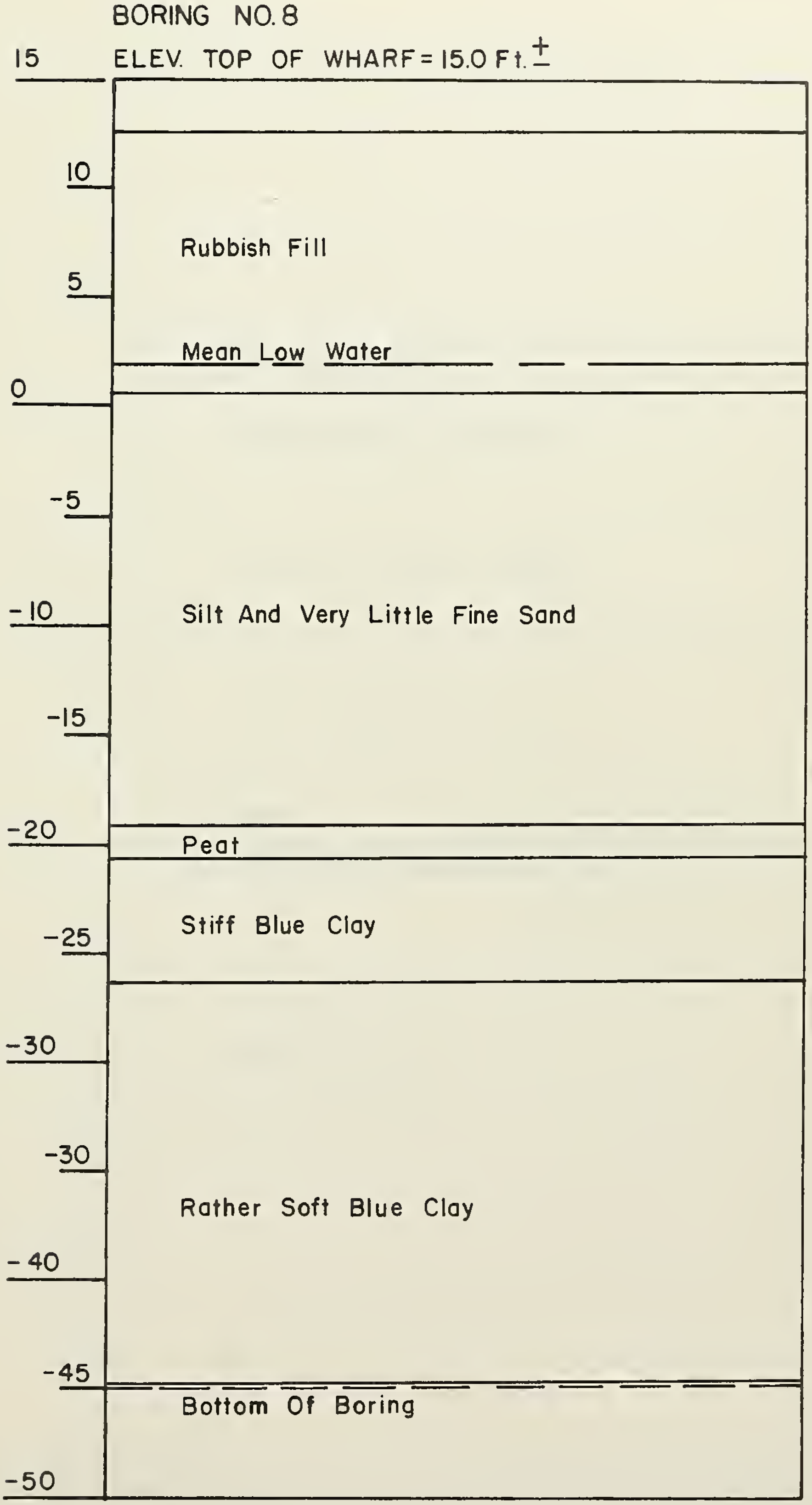
Quincy Market Cold-Storage & Warehouse Co., T Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.



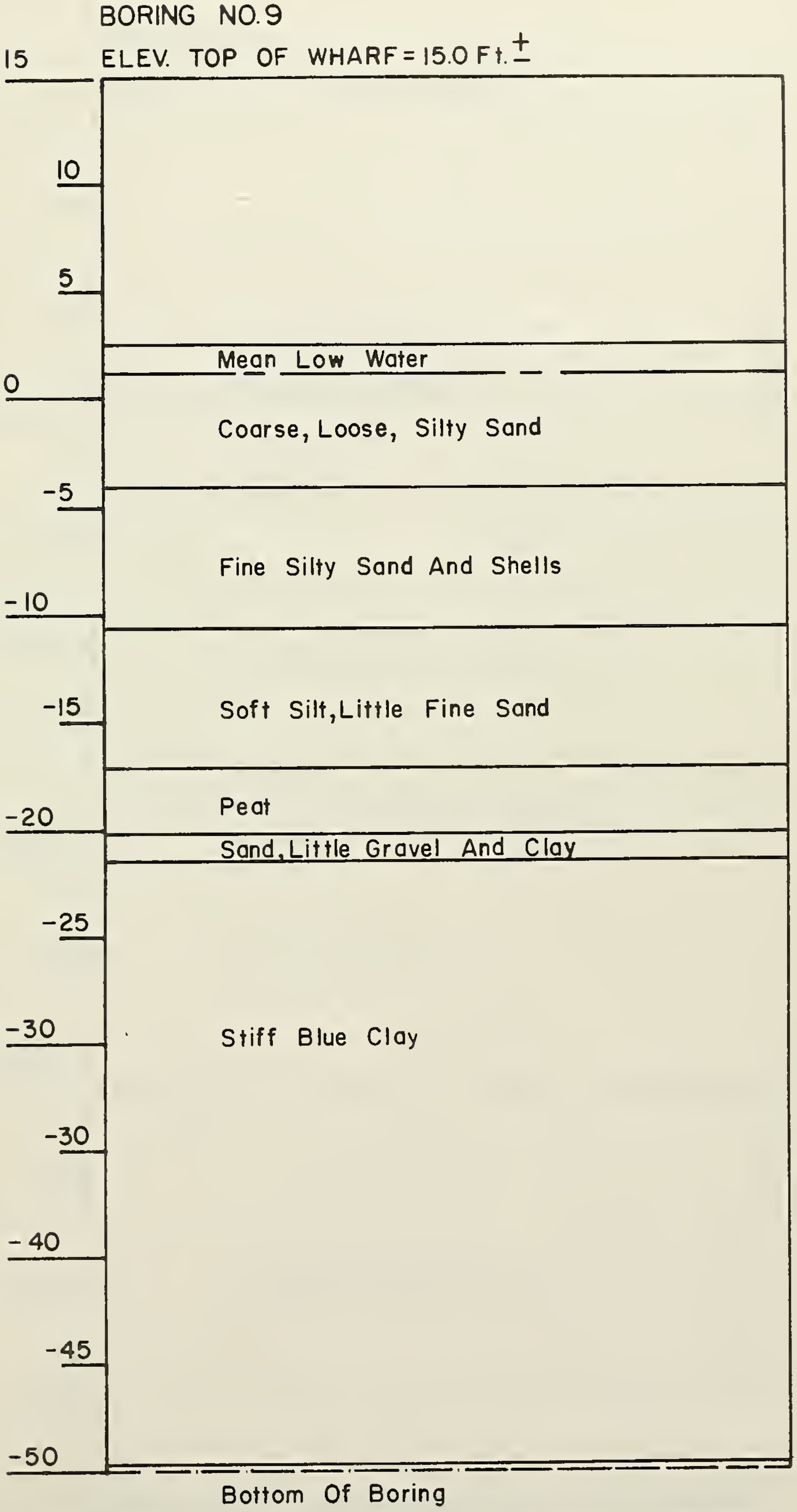
Quincy Market Cold Storage & Warehouse Co., ‘T’ Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.



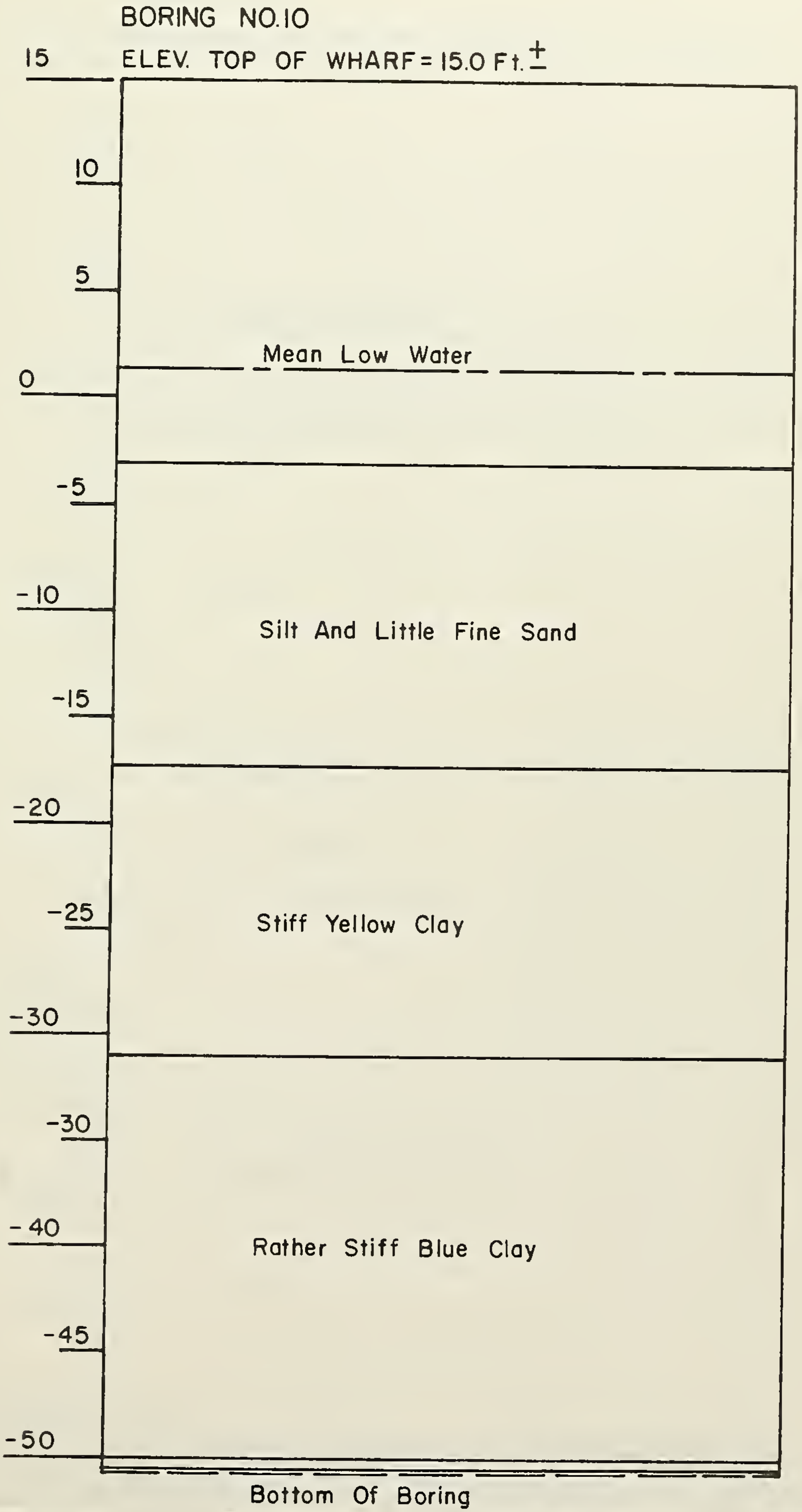
Quincy Market Cold Storage & Warehouse Co.,"T" Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.


BORING NO. 9
ELEV. TOP OF WHARF = 15.0 Ft. ±
15
10
5
0
-5
-10
-15
-20
-25
-30
-30
-40
-45
-50
Mean Low Water
Coarse, Loose, Silty Sand
Fine Silty Sand And Shells
Soft Silt, Little Fine Sand
Peat
Sand, Little Gravel And Clay
Stiff Blue Clay
Bottom Of Boring

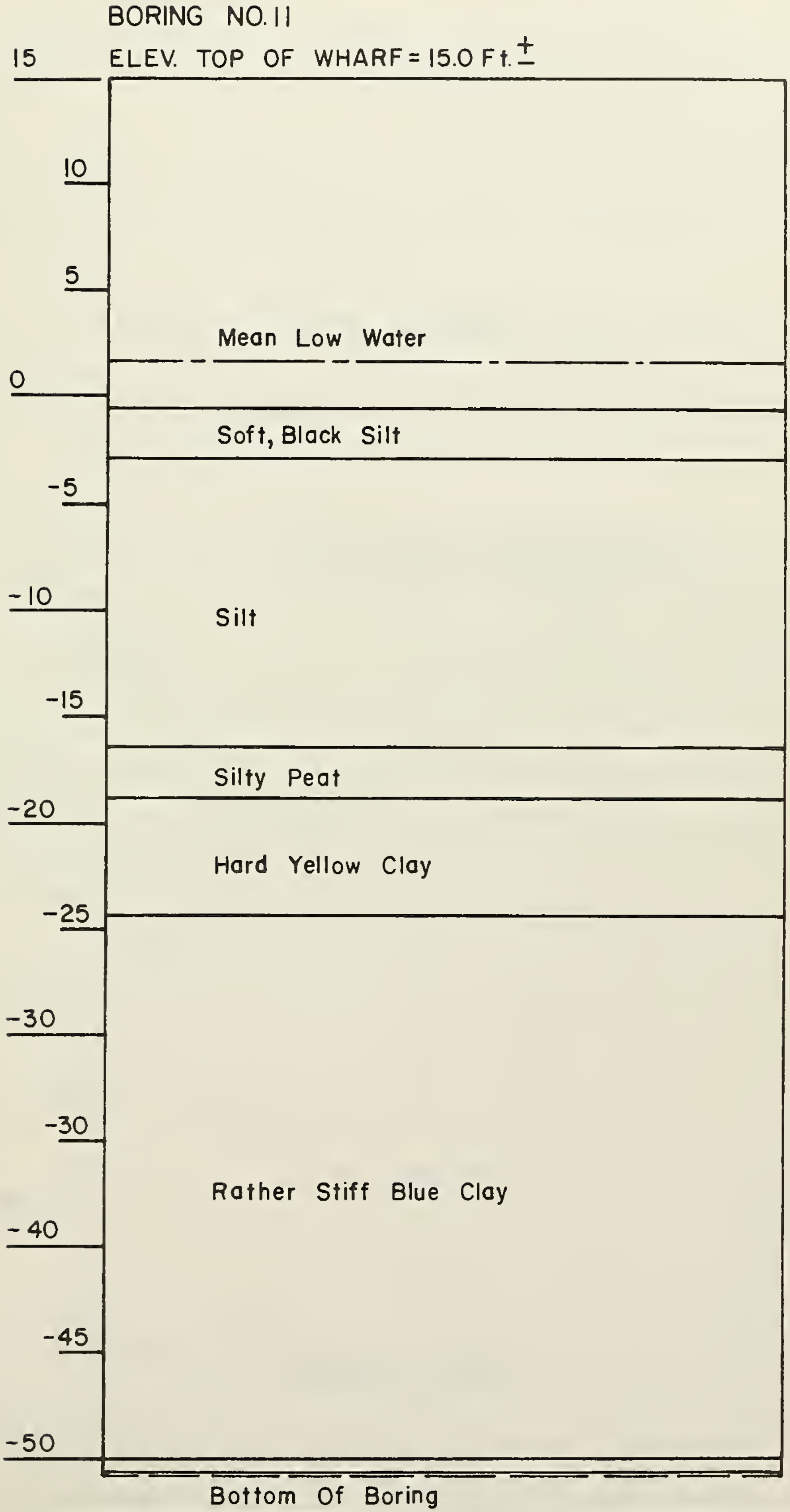
Quincy Market Cold Storage & Warehouse Co.`, T´Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.



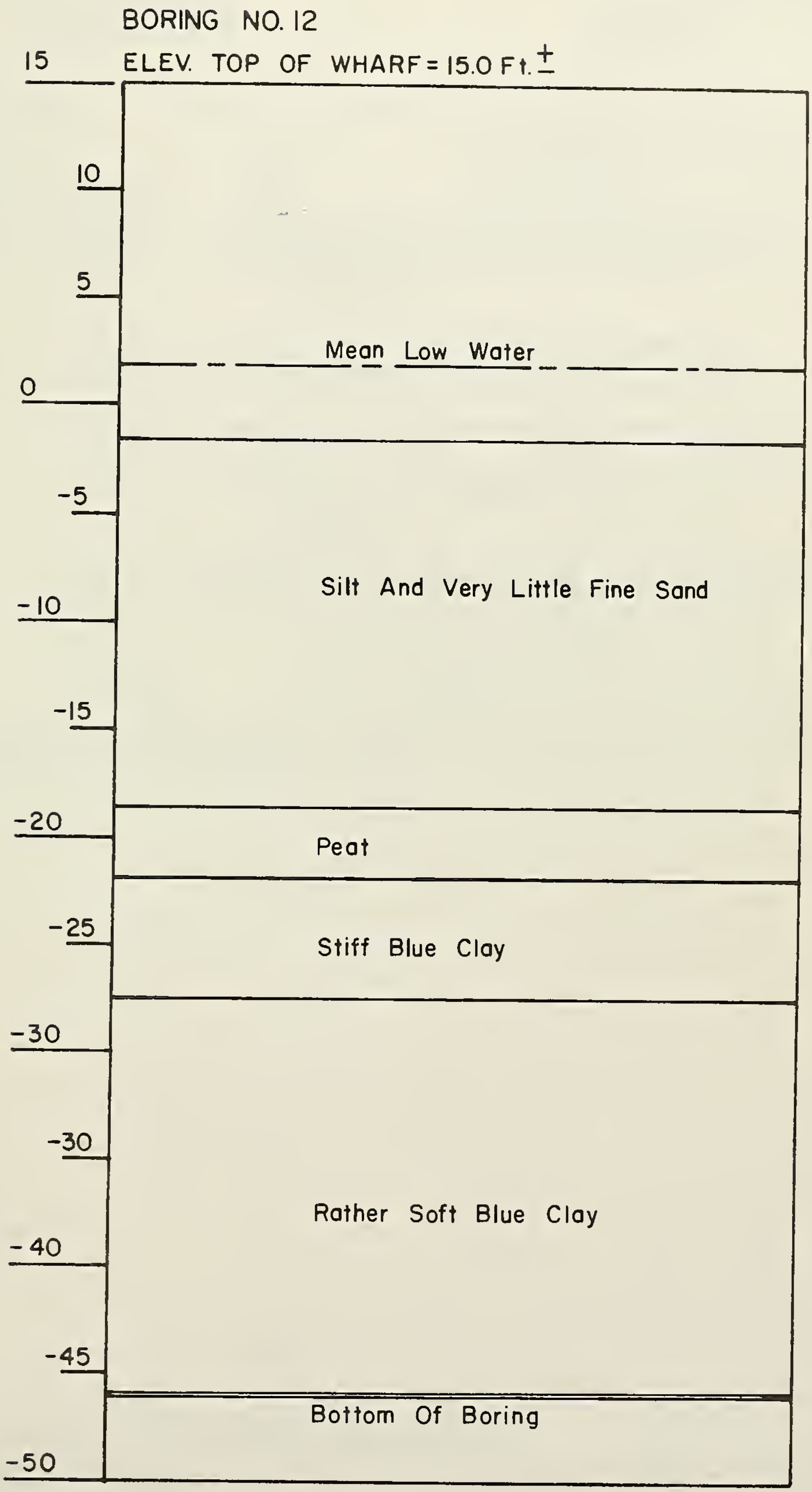
Quincy Market Cold Storage & Warehouse Co., T Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.



Quincy Market Cold Storage & Warehouse Co.`T´Wharf, Boston, Mass.

Profile Of Boring Taken By Charles R. Gow Co.
Aug. 21-25, 1916 Vert. Scale 1"=8'
H.S. Adams, C.E.



BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/1/70
FINISHED 6/1/70

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -12.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-80	-12.0'	-18.0'	MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH
	-18.0'	-22.0'	MOIST SOFT, GRAY ORGANIC SILT TRACE OF WOOD	2
	-22.0'	-30.5'	MOIST VERY STIFF, GRAY BLUE CLAY	27
	-30.5'	-62.0'	MOIST STIFF, GRAY BLUE YELLOW CLAY	8
	-62.0'	-69.58'	MOIST VERY DENSE, GRAY FINE SAND & SILT, TRACE OF CLAY	68
	-69.58'		(NO RECOVERY)	131

ELEV. BOTTOM OF BORING: —69.58'

Water Surface Below Starting Grade+12.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length-----Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/2/70 — 11:45 AM
FINISHED 6/2/70 — 2:30 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. −21.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—80—A	-21.5'	-26.0'	MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH
	-26.0'	-27.0'	GRAY ORGANIC SILT (NO RECOVERY)	
	-27.0'	-34.5'	MOIST VERY STIFF, GRAY BLUE CLAY	25
	-34.5'	-46.0'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	7
			AT 44.5' BECOMES MOIST STIFF	9

ELEV. BOTTOM OF BORING: −46.0'

Water Surface Below Starting Grade +21.5 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches

Casing Dia. 2-1/2 Inches, Length------Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/2/70 - 8:45 AM
FINISHED 6/2/70 - 11:30 AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -22.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-80-B	-22.0'	-28.0'	MOIST SOFT, BLACK ORGANIC SILT	PUSH
	-28.0'	-34.5'	MOIST VERY STIFF, YELLOW BLUE CLAY TRACE OF GRAY SILT IN LAYERS	23
	-34.5'	-46.5'	MOIST STIFF, GRAY BLUE YELLOW CLAY TRACE OF SILT	9
			(THIN TRACES OF FINE SAND)	9

ELEV. BOTTOM OF BORING: -46.5'

Water Surface Below Starting Grade +22.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length____Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG &T WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST E. PROVIDENCE R.I.

DATE: STARTED 5/27/70 - 7:00 AM
FINISHED 5/27/70 - 11:30 AM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV.-3.30'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—81	-3.30'	-18.30'	MOIST SOFT, GRAY ORGANIC SILT	PUSH
	-18.30'	-30.30'	MOIST VERY STIFF, BLUE YELLOW CLAY	18
	-30.30'	-41.80'	WET MEDIUM STIFF, BLUE CLAY	4 5

ELEV. BOTTOM OF BORING: -41.80'

Water Surface Below Starting Grade +18.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. B X F Inches, Length____Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/25/70 – 7:00 AM
FINISHED 5/25/70 – 1:00 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 5.30'

SCALE: 1" = 8'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B – 82	5.30'	– 7.7'	MOIST SOFT, GRAY ORGANIC SILT	2
	–7.7'	– 24.7'	WET STIFF, BLUE YELLOW CLAY & SILT	12
	–24.7'	–36.2'	WET STIFF, BLUE CLAY	8 8

ELEV. BOTTOM OF BORING: –36.2'

Water Surface Below Starting Grade +10.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length------Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST.
E. PROVIDENCE R.I.

DATE: STARTED 6/10/70 - 7:00 AM
FINISHED 6/10/70 - 12 NOON

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. - 12.1'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B - 83	-12.1'	-17.1'	MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH
	-17.1'	-20.1'	MOIST SOFT, GRAY ORGANIC SILT, TRACE OF WOOD & SHELLS	3
	-20.1'	-34.1'	MOIST VERY STIFF, GRAY BLUE CLAY	27
	-34.1'	-44.1'	MOIST STIFF, BLUE YELLOW CLAY, TRACE OF SILT	9 8

ELEV. BOTTOM OF BORING: - 44.1'

Water Surface Below Starting Grade +12.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length ---- Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/8/70 - 1:00 AM
FINISHED 6/8/70 - 3:00 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. 8.67'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B — 84	8.67'	-1.16'	MOIST DENSE, BROWN COARSE TO FINE SAND, SOME FINE COARSE GRAVEL, TRACE OF SILT (GRANITE BOULDERS) (FILL) (NO RECOVERY)	41 250

ELEV. BOTTOM OF BORING: 8.67'

Water Surface Below Starting Grade TIDAL Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length----Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/9/70 – 7:00 AM
FINISHED 6/9/70 – 1:00 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. –5.67'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B – 84 – A	-5.67'	-14.67'	WET SOFT, BLACK GRAY ORGANIC SILT (MUCK)	PUSH
	-14.67'	-21.67'	MOIST STIFF, GRAY ORGANIC SILT, TRACE OF WOOD	11
	-21.67'	-32.67'	MOIST VERY STIFF, GRAY BLUE CLAY, TRACE OF FINE SAND SEAMS	29
	-32.67'	-43.67'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	8 7

ELEV. BOTTOM OF BORING: –43.67'

Water Surface Below Starting Grade +5.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length____Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/1/70 - 1:00 PM
FINISHED 6/2/70 - 8:00 AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -16.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-85	-16.0'	-23.0'	MOIST SOFT, BLACK ORGANIC SILT (MUCK), TRACE OF FINE GRAVEL (WOOD)	PUSH
	-23.0'	-24.0'	GRAY ORGANIC SILT (NO RECOVERY)	
	-24.0'	-45.5'	MOIST VERY STIFF, GRAY BROWN CLAY	23 10
			AT -20.0' BECOMES MOIST STIFF	9

ELEV. BOTTOM OF BORING: -45.5'

Water Surface Below Starting Grade +16.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/9/70—7:00 AM
FINISHED 6/11/70—3:00 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 5.68'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—86	5.68'	−21.32'	GRANITE FOUNDATION	
			5.68' TO 0.68' - RECOVERY 48"	C
			0.68' TO −2.32' - RECOVERY 36'	C
			−2.32' TO —4.32 - RECOVERY 24'	C
			−4.32' TO −5.82' WET STIFF, BLACK ORGANIC SILT & SHELLS	14
			GRANITE FOUNDATION	
			−7.32' TO −14.32' - RECOVERY 30"	C
			−14.32' TO −14.99' WET VERY STIFF, BLACK ORGANIC SILT & SHELLS	22
			GRANITE FOUNDATION	
			−17.32' TO −21.32' - RECOVERY 36"	C

ELEV. BOTTOM OF BORING: - 21.32'

Water Surface Below Starting Grade +2.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches

Casing Dia. BXF Inches, Length...... Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/3/70 - 7:00 A M
FINISHED 6/3/70 - 12 NOON

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -20.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B - 87	-20.5'	-26.5'	MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH
	-26.5'	-29.5'	MOIST SOFT, GRAY BROWN ORGANIC SILT	3
	-29.5'	-30.5'	GRAY FINE SAND (NO RECOVERY)	
	-30.5'	-36.5'	MOIST VERY STIFF, GRAY BLUE CLAY	23
	-36.5'	-84.5'	MOIST STIFF, GRAY BLUE CLAY, TRACE OF SILT	7
	-84.5'	-85.5'	MOIST VERY DENSE GRAY F-C SAND SOME F-M GRAVEL, LITTLE CLAY	164

ELEV. BOTTOM OF BORING: -85.5'

Water Surface Below Starting Grade +20.5 Ft.

Figures In Log Column, Unless Excepted = Blows With 140" Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length .... Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST.
E. PROVIDENCE R.I.

DATE: STARTED 6/3/70 - 12:30 PM
FINISHED 6/3/70 - 2:30 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -16.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B - 88	-16.0'	-22.5'	(NO RECOVERY) MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH PUSH
	-22.5'	-29.0'	MOIST SOFT, GRAY BROWN ORGANIC SILT	3
	-29.0'	-35.5'	MOIST STIFF, GRAY BLUE YELLOW CLAY	13
	-35.5'	-46.0'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	6 8

ELEV. BOTTOM OF BORING: -46.0'

Water Surface Below Starting Grade +16 .0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length.......Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/4/70— 7:00 AM
FINISHED 6/4/70—10:00 AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. −18.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-89	-18.5'	-22.0'	MOIST SOFT, BLACK ORGANIC (NO REC.) SILT (MUCK) (NO. REC.)	PUSH PUSH
	-22.0'	-28.0'	MOIST MEDIUM STIFF, GRAY ORGANIC SILT, TRACE OF WOOD	6
	-28.0'	-36.5'	MOIST VERY STIFF, GRAY BLUE CLAY	22
	-36.5'	-47.5'	MOIST STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	9 8

ELEV. BOTTOM OF BORING: −47.5'

Water Surface Below Starting Grade +18.5Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length........Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/12/70 - 11:00 AM
FINISHED 6/16/70 - 10:00 AM

DRILLER: E. HEDSTROM
INSPECTOR: H. WILLIAMS

ELEV. 11.90'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-90	11.9'	8.9'	MOIST MEDIUM DENSE, BLACK FINE TO COARSE SAND & FINE TO COARSE GRAVEL, COBBLES & BOULDERS	26
			AT -3.6' BECOMES MOIST LOOSE	8
			(WOOD PILING)	O.E.R.
	8.9'	-14.1'	(NO RECOVERY)	25
	-14.1	-20.6'	MOIST SOFT, GRAY ORGANIC SILT, TRACE OF FINE SAND	4
	-20.6'	-30.6'	MOIST VERY STIFF, YELLOW BLUE CLAY	28

ELEV. BOTTOM OF BORING: -30.6'

Water Surface Below Starting Grade 3 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length........Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/4/70 - 10:00AM
FINISHED 6/4/70 - 12:30PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -6.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B - 91	-6.5'	-8.0'	MOIST SOFT, BLACK ORGANIC SILT (MUCK) (NO RECOVERY)	PUSH
			AT -12.5' TRACE OF WOOD	
	-8.0'	-21.0'	MOIST LOOSE, BLACK FINE TO MEDIUM SAND, TRACE OF FINE TO MEDIUM GRAVEL, TRACE OF ORGANIC SILT	4
	-21.0'	-33.5'	MOIST VERY STIFF, GRAY BLUE CLAY	24
	-33.5'	-44.5'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	6 7

ELEV. BOTTOM OF BORING: -44.5'

Water Surface Below Starting Grade +6.5 Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length_____Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/8/70- 7:00 AM
FINISHED 6/8/70-12:30 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. 14.65'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-92	14.65'	2.65'	DRY LOOSE, 8" STONE-BROWN FINE TO COARSE SAND & FINE TO MEDIUM GRAVEL, TRACE OF SILT (FILL)	3
	2.65'	-4.35'	MOIST SOFT, GRAY ORGANIC SILT, LITTLE FINE TO COARSE SAND & FINE TO MEDIUM GRAVEL, TRACE OF SHELLS	3
	-4.35'	-19.35'	MOIST MEDIUM DENSE, GRAY FINE SAND SOME ORGANIC SILT	17
	-19.35'	-29.35'	MOIST VERY STIFF, GRAY BLUE CLAY	20
	-29.35'	-39.35'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	7 8

ELEV. BOTTOM OF BORING: -39.35'

Water Surface Below Starting Grade 10.5 Ft. IN 1/2 HRS.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/29/70 – 10:00 AM
FINISHED 5/29/70 – 2:30 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 3.13'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—93	3.13'	-3.87'	WET LOOSE, BLACK FINE TO COARSE SAND, SOME FINE TO COARSE GRAVEL, LITTLE ORGANIC SILT	PUSH
	-3.87'	-18.87'	WET MEDIUM STIFF, GRAY SILT	5
	-18.87'	-34.87'	WET VERY STIFF, BLUE YELLOW CLAY, SOME SILT IN SEAMS	21
	-34.87'	-46.37'	MOIST STIFF, BLUE YELLOW CLAY	9 10

ELEV. BOTTOM OF BORING: -46.37'

Water Surface Below Starting Grade + 1.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length____Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/21/70 - 10:00 AM
FINISHED 5/22/70 - 11:00 AM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 6.38'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—94	6.38'	-6.62'	MOIST LOOSE, SILT, SAND, ASH & WOOD (FILL)	5
			AT 1.35' BECOMES MOIST VERY DENSE	67
	-6.62'	-27.62'	MOIST SOFT, GRAY ORGANIC SILT, TRACE OF WOOD	2
	-27.62'	-34.62'	MOIST VERY STIFF, BLUE YELLOW CLAY, LITTLE SILT	18
	-34.62'	-72.12'	MOIST MEDIUM STIFF, BLUE CLAY	5
	-72.12'	-80.87'	MOIST VERY DENSE, GRAY FINE TO COARSE SAND, SOME FINE TO COARSE GRAVEL, LITTLE SILT, TRACE OF CLAY	99 100

ELEV. BOTTOM OF BORING: -80.87'

Water Surface Below Starting Grade 11.92Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length........Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type: SPILT SPOON.

BORING REPORT OF LONG &'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/27/70 - 9:30 AM
FINISHED 5/27/70 - 2:00 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -18.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—95	-18.0'	-25.5'	MOIST SOFT, GRAY ORGANIC SILT, LITTLE CLAY	PUSH
	-25.5'	-34.0'	MOIST VERY STIFF, GRAY YELLOW CLAY	27
	-34.0'	-60.5'	MOIST STIFF, GRAY CLAY WITH TRACE OF YELLOW CLAY	9
	-60.5'	-68.0'	MOIST MEDIUM DENSE, GRAY FINE TO MEDIUM SAND, SOME FINE TO COARSE GRAVEL, COBBLES	27
			AT 67.0' BECOMES MOIST VERY DENSE	151

ELEV. BOTTOM OF BORING: -68.0'

Water Surface Below Starting Grade +8.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length------Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type: SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/27/70 3:00PM
FINISHED 5/28/70-1:00PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -3.1'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—96	-3.1'	-22.6'	MOIST SOFT, 8" BLACK ORGANIC SILT, GRAY ORGANIC SILT (TRACE OF BROWN PEAT)	
	-22.6'	-29.6'	MOIST VERY STIFF, GRAY BLUE CLAY	27
	-29.6'	-63.1'	MOIST STIFF, GRAY BLUE CLAY	11
	-63.1'	-76.6'	MOIST VERY STIFF, GRAY FINE TO MEDIUM SAND, SOME FINE TO MEDIUM GRAVEL, LITTLE SILT, TRACE OF CLAY, COBBLES (SHALE FRAGMENTS)	73 157

ELEV. BOTTOM OF BORING: -76.6'

Water Surface Below Starting Grade +3.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length.......Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/3/70 - 3:00 PM
FINISHED 6/4/70 - 1:30 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 12.90'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-97	12.90'	4.90'	MOIST MEDIUM DENSE, BROWN FINE TO COARSE SAND & GRAVEL WITH RED BRICKS, (FILL)	19
	4.90'	.90'	WET SOFT, BLACK ORGANIC SILT, SOME FINE TO COARSE SAND, TRACE OF SHELLS	PUSH
	.90'	-7.1'	WET SOFT, BLACK ORGANIC SILT	3
	-7.1'	17.1'	WET MEDIUM STIFF, GRAY ORGANIC SILT	7
	-17.1'	-20.1'	WET MEDIUM STIFF, BROWN PEAT	8
	-20.1'	-26.1'	WET STIFF, BLUE CLAY	14
	-26.1'	-34.1'	WET VERY STIFF, BLUE YELLOW CLAY	23
	-34.1'	-74.1'	WET MEDIUM STIFF, BLUE CLAY	7
	-74.1'	-80.43'	WET VERY DENSE, BLUE FINE TO COARSE SAND & GRAVEL, TRACE OF SILT & CLAY	52
		-80.43'	100 BLOWS - NO PENETRATION	

ELEV. BOTTOM OF BORING: -80.43'

Water Surface Below Starting Grade 4.75 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia BXF Inches, Length......Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/1/70 - 11:00 AM
FINISHED 6/2/70 - 11:00 AM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 3.2'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-98	3.2'	1.7'	WET LOOSE, BLACK FINE TO COARSE SAND & FINE GRAVEL, TRACE OF ORGANIC SILT & SHELLS	8
	1.7'	-24.8'	WET STIFF, GRAY SILT, SOME FINE TO COARSE SAND	10
	-24.8'	-28.8'	WET STIFF, GRAY SILT & CLAY, SOME FINE TO COARSE SAND	14
			AT -38.8' BECOMES WET MEDIUM STIFF	5
	-28.8'	-60.8'	WET VERY STIFF, BLUE YELLOW CLAY	24
	-60.8'	-70.13'	WET DENSE, BLUE GRAY FINE TO COARSE SAND, & FINE TO MEDIUM GRAVEL, SOME SILT	34
			(NO RECOVERY)	100

ELEV. BOTTOM OF BORING: -70.13'

Water Surface Below Starting Grade 2.08 Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length____Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/28/70 - 12:30 PM
FINISHED 5/28/70 - 3:15 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 2.72'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-99	2.72'	-1.28'	MOIST SOFT, GRAY BLACK ORGANIC SILT	2
	-1.28'	-24.28'	MOIST MEDIUM STIFF, GRAY SILT, SOME VERY FINE SAND	8 6
	-24.28'	-32.28'	MOIST VERY STIFF, BLUE YELLOW CLAY, LITTLE SILT	30
	-32.28'	-42.28'	MOIST VERY STIFF, YELLOW CLAY	26
	-42.28'	-53.78'	WET MEDIUM STIFF, BLUE YELLOW CLAY	

ELEV. BOTTOM OF BORING: -53.78'

Water Surface Below Starting Grade 1.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length______Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/22/70 - 1:00PM
FINISHED 5/22/70 - 3:00PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 2.72'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B — 100	2.72'	-11.28'	WET SOFT, BLACK SILT & WOOD (WOOD)	2 2

ELEV. BOTTOM OF BORING: -11.28'

Water Surface Below Starting Grade +1.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length...... Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & T WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST.
E. PROVIDENCE R.I.

DATE: STARTED 5/26/70 - 1:30 PM
FINISHED 5/27/70 - 2:00 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 3.72'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-100-A	3.72'	-19.28'	MOIST SOFT, GRAY ORGANIC SILT, TRACE OF FINE SAND	
	-19.28'	-24.28'	MOIST VERY STIFF, GRAY ORGANIC SILT & CLAY, SOME WOOD & ORGANIC MATT MATTER	30

ELEV. BOTTOM OF BORING: -24.28'

Water Surface Below Starting Grade +1.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length......Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG &'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/27/70 — 2:00 PM
FINISHED 5/28/70 - 11:30 AM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 3.72'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-100-B	3.72'	-9.28'	MOIST SOFT, GRAY ORGANIC SILT	2
	-9.28'	-21.28'	MOIST STIFF, GRAY ORGANIC SILT, TRACE OF FINE SAND	10
	-21.28'	-25.28'	MOIST VERY STIFF, BLUE CLAY, TRACE OF FINE SAND	18
	-25.28'	-32.28'	MOIST VERY STIFF, BLUE YELLOW CLAY	23
	-32.28'	-42.78'	WET STIFF, BLUE CLAY	8

ELEV. BOTTOM OF BORING: -42.78'

Water Surface Below Starting Grade + 2.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length......Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/2/70 - 1:30 PM
FINISHED 6/3/70 - 1:00 PM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. +2.3'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—101	+2.3'	-7.7'	WET VERY STIFF, BLACK ORGANIC SILT & WOOD	17
	-7.7'	-11.7'	WET STIFF, GRAY SILTY CLAY, SOME WOOD	8
	-11.7'	-19.7'	WET VERY STIFF, GRAY BLUE CLAY WITH FINE TO COARSE SAND LAYERS	20
	-19.7'	-31.7'	WET VERY STIFF, GRAY YELLOW CLAY	19
	-31.7'	-42.2'	WET STIFF, BLUE CLAY	8

ELEV. BOTTOM OF BORING: -42.2'

Water Surface Below Starting Grade +6.25 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. B X F Inches, Length.....Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/26/70 - 8:30 AM
FINISHED 5/26/70 - 2:00 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. −6.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B−102	−6.0'	−18.5'	MOIST SOFT, BLACK ORGANIC SILT (MUCK)	PUSH
	−18.5'	−26.0'	MOIST VERY STIFF, GRAY CLAY	22
	−26.0'	−66.5'	MOIST STIFF, GRAY YELLOW CLAY	13
	−66.5'	−71.0'	MOIST DENSE, GRAY FINE TO COARSE SAND, SOME FINE TO COARSE GRAVEL, TRACE OF CLAY, COBBLES	42 203

ELEV. BOTTOM OF BORING: −71.0'

Water Surface Below Starting Grade +6.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing: Dia. 2−1/2 Inches, Length_____Ft. 2" O.D. Sampler Dia. 1−3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & ‘T’ WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/26/70 - 2:30 PM
FINISHED 5/27/70 - 9:30 AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -8.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-103	-8.5'	-14.5'	MOIST SOFT, BLACK ORGANIC SILT	PUSH
	-14.5'	-15.5'	6' TO 7' WOOD (NO RECOVERY)	
	-15.5'	-24.5'	MOIST MEDIUM DENSE, BLACK FINE TO COARSE SAND, TRACE OF FINE GRAVEL, TRACE OF ORGANIC SILT	15
	-24.5'	-31.5'	MOIST VERY STIFF, GRAY CLAY	24
	-31.5'	-41.5'	MOIST MEDIUM STIFF, GRAY YELLOW CLAY	7 8

ELEV. BOTTOM OF BORING: -41.5'

Water Surface Below Starting Grade + 8.5Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length____Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST.
E. PROVIDENCE R.I.

DATE: STARTED 5/28/70 - 1:00PM
FINISHED 5/29/70 - 8:30AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. -10.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-104	-10.0'	-11.0'	BLACK. ORGANIC SILT (NO RECOVERY)	
	-11.0'	-24.0'	MOIST SOFT, GRAY ORGANIC SILT	1
	-24.0'	-30.5'	MOIST VERY STIFF, GRAY BLUE CLAY WITH YELLOW CLAY STREAKS	27
	-30.5'	-41.5'	MOIST MEDIUM STIFF, GRAY YELLOW CLAY, TRACE OF SILT	8 7

ELEV. BOTTOM OF BORING: -41.5'

Water Surface Below Starting Grade + 10.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140# Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length____Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG &`T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/29/70- 8:30AM
FINISHED 5/29/70- 11:45AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. −10.5'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B—105	−10.5'	−12.0'	MOIST SOFT, BLACK ORGANIC SILT (NO RECOVERY)	PUSH 3
			(AT −24.5' TRACE OF BROWN PEAT)	
	−12.0'	−26.0'	MOIST SOFT, GRAY ORGANIC SILT	3
	−26.0'	−33.5'	MOIST HARD, GRAY BLUE CLAY	32
	−33.5'	−44.5'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE OF SILT	7 8

ELEV. BOTTOM OF BORING: −44.5'

Water Surface Below Starting Grade + 10.5 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length____ Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type. SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 5/29/70 - 11:30 AM
FINISHED 5/29/70 - 2:45 PM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. —10.0'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-106	-10.0'	-11.5'	MOIST SOFT, BLACK ORGANIC SILT (NO RECOVERY) (AT -25.0' TRACE OF BROWN PEAT)	PUSH
	-11.5'	-26.5'	MOIST SOFT, GRAY ORGANIC SILT	2
	-26.5'	-34.0'	MOIST VERY STIFF, GRAY BLUE CLAY	29
	-34.0'	-44.5'	MOIST MEDIUM STIFF, GRAY BLUE YELLOW CLAY, TRACE. OF SILT	7 8

ELEV. BOTTOM OF BORING: -44.5'

Water Surface Below Starting Grade +10.0Ft.

Figures In Log Column, Unless Excepted = Blows With 140 # Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

BORING REPORT OF LONG & 'T' WHARFS — BOSTON, MASS.
BY THE
AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/5/70 - 2:00 PM
FINISHED 6/8/70 - 10:00 AM

DRILLER: R. ANDREWS
INSPECTOR: H. WILLIAMS

ELEV. 12.60'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-107	12.60'	2.60'	MOIST MEDIUM DENSE, BROWN FINE TO COARSE SAND & GRAVEL (FILL)	13
	2.60'	-2.4'	WET SOFT, GRAY ORGANIC SILT & WOOD	4
	-2.4'	-22.4'	WET MEDIUM STIFF, GRAY SILTY CLAY (ORGANIC)	6
	-22.4'	-35.4'	WET VERY STIFF, YELLOW BLUE CLAY	27
	-35.4'	-46.9'	WET MEDIUM STIFF, BLUE CLAY	6

ELEV. BOTTOM OF BORING: -46.9'

Water Surface Below Starting Grade 8.5 Ft.

Figures In Log Column, Unless Excepted = Blows With 140" Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. BXF Inches, Length ...... Ft. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches, Type SPILT SPOON.

BORING REPORT OF LONG & ‘T’ WHARFS — BOSTON, MASS.

BY THE

AMERICAN DRILLING CO. INC.

54 WATER ST. E. PROVIDENCE R.I.

DATE: STARTED 6/11/70 - 7:00 AM
FINISHED 6/12/70 - 11:45 AM

DRILLER: T. CANNING
INSPECTOR: H. WILLIAMS

ELEV. 11.2'

NUMBER	FROM	TO	DESCRIPTION	BLOWS
B-108	11.2'	-2.3'	(NO RECOVERY)	13
			MOIST DENSE, BROWN FINE TO MEDIUM SAND, SOME FINE TO MEDIUM GRAVEL, TRACE OF SILT, COBBLES (FILL)	47
	-2.3'	-3.3'	GRANITE - 13.5' - 14.5' - REC. 12"	C
	-3.3'	-8.3'	MOIST VERY DENSE, (FILL) (NO REC.)	111
	-8.3'	-9.8'	GRANITE - 19.5' - 21' - REC. 18"	C
	-9.8'	-15.8'	MOIST MEDIUM DENSE, BROWN FINE TO COARSE GRAVEL, LITTLE FINE TO MEDIUM SAND, LITTLE ORGANIC SILT, RIP RAP ROCK (NO REC.)	18 170

ELEV. BOTTOM OF BORING: -15.8'

Water Surface Below Starting Grade 19.0 Ft.

Figures In Log Column, Unless Excepted = Blows With 140 $^{\#}$ Wt. Falling 30 Inches To Drive Sampler 12 Inches.

Casing Dia. 2-1/2 Inches, Length Ft.. 2" O.D. Sampler Dia. 1-3/8" I.D. Inches,
Type: SPILT SPOON.

NUMBER AND LOCATION	DEPTHS FROM	TO	FORMATION	PENETR. RESIST. (Bl / Ft.)
908—M7	0.0	8.0	Organic Silt	
	8.0	26.0	Yellow & blue Clay	17
	26.0	36.5	Yellow & blue Clay, fine Sand lenses	7
	36.5	46.5	Blue Clay	7
	46.5	59.0	Blue Clay, fine Sand lenses	6
	59.0	68.4	Blue Clay	16
	68.4	71.5	Fine Sand	71
	71.5	78.5	Silty Sand & little coarse Gravel Till	51
	78.5	80.0	Boulders	Cored
	80.0	81.0	Shale	100
	81.0	91.0	Rock	Cored

Elev. Ex. Ground: —12.51'
Depth Gr. Water: Not Given

NUMBER AND LOCATION	DEPTHS		FORMATION	PENETR. RESIST. (Bl/Ft.)
	FROM	TO		
918—N8	0.0	19.0	Misc. Fill	6
	19.0	21.0	Silty Sand	20
	21.0	35.5	Blue Clay	8

Elev. Ex. Ground: 14.5'
Depth Gr. Water: Not Given

NUMBER AND LOCATION	DEPTHS FROM	TO	FORMATION	PENETR. RESIST. (Bl / Ft.)
940—N7	0.0	17.6	Fill & Wood	
	17.6	33.6	Organic Silt	4
	33.6	60.0	Yellow Clay	6
	60.0	95.0	Yellow Clay, trace Sand	5
	95.0	103.0	Sand, some Gravel, trace Silt	30
	103.0	129.0	Talc, Rock	Cored

Elev. Ex. Ground: Not Given
Depth Gr. Water: Not Given

BOSTON TRANSIT COMMISSION
BORING DATA

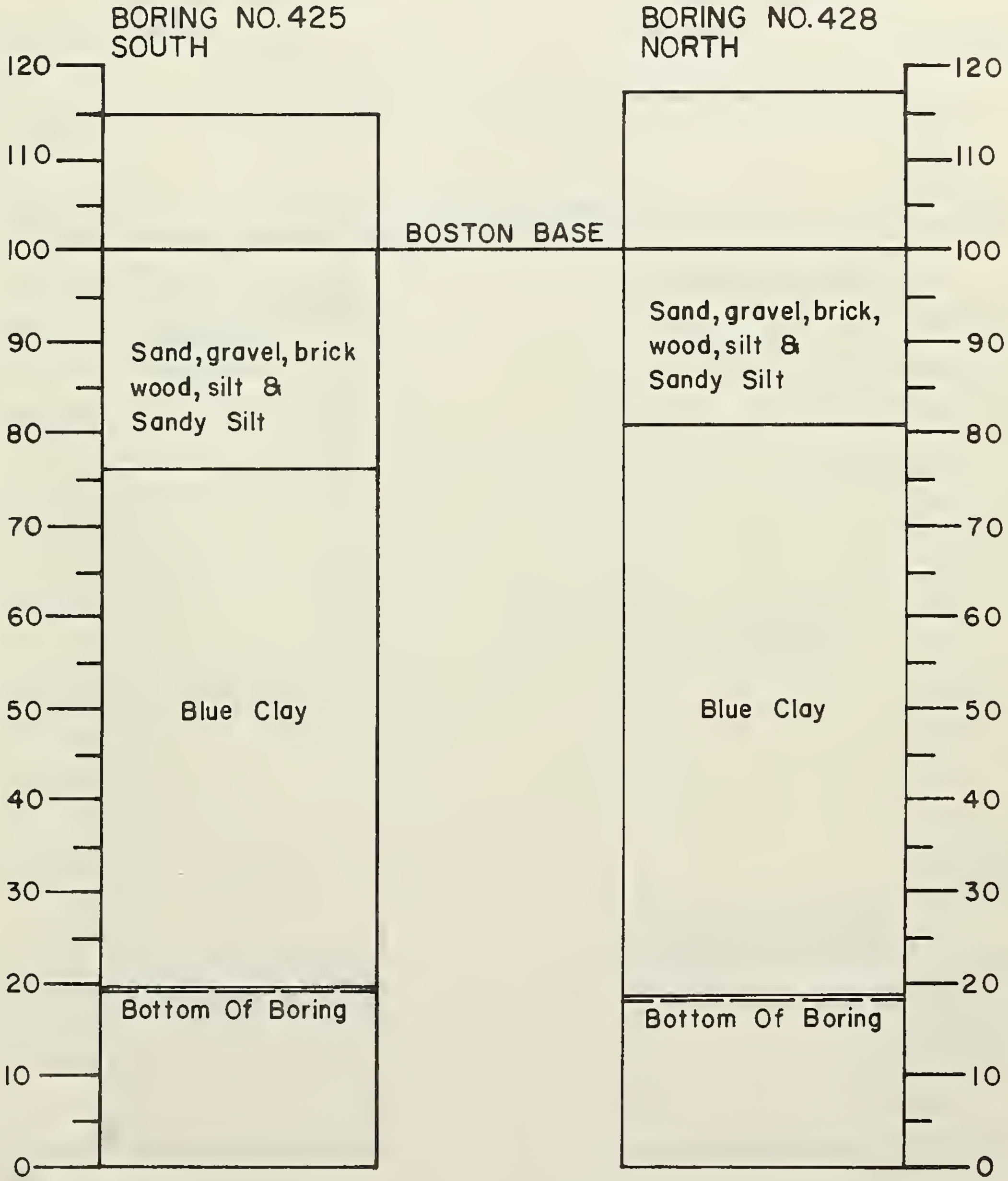
TAKEN FROM PLAN TITLED

LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL

AT LONG WHARF

VERT. SCALE: 1" = 20'

DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION

BORING DATA

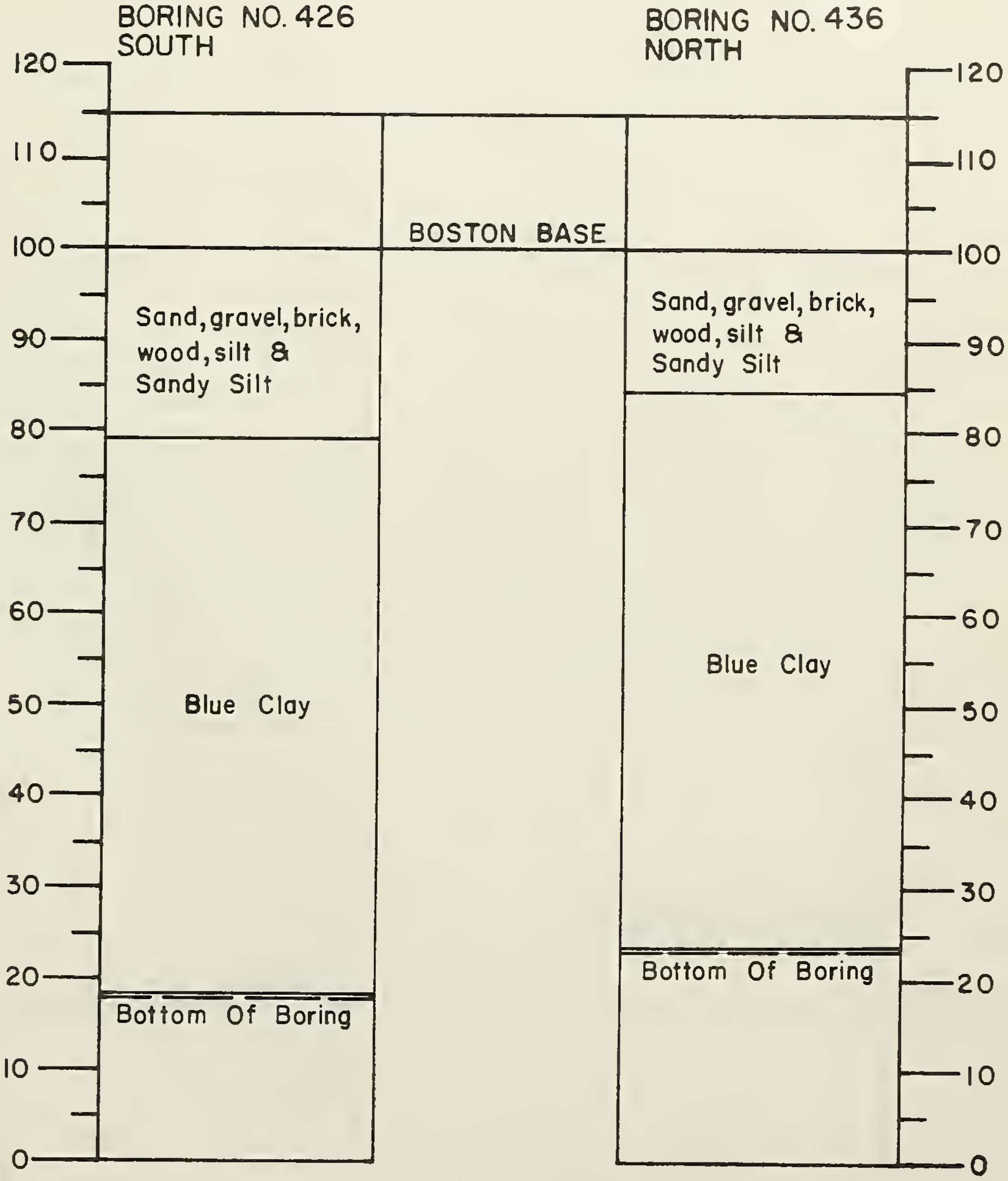
TAKEN FROM PLAN TITLED

LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL

AT LONG WHARF

VERT. SCALE: 1" = 20'

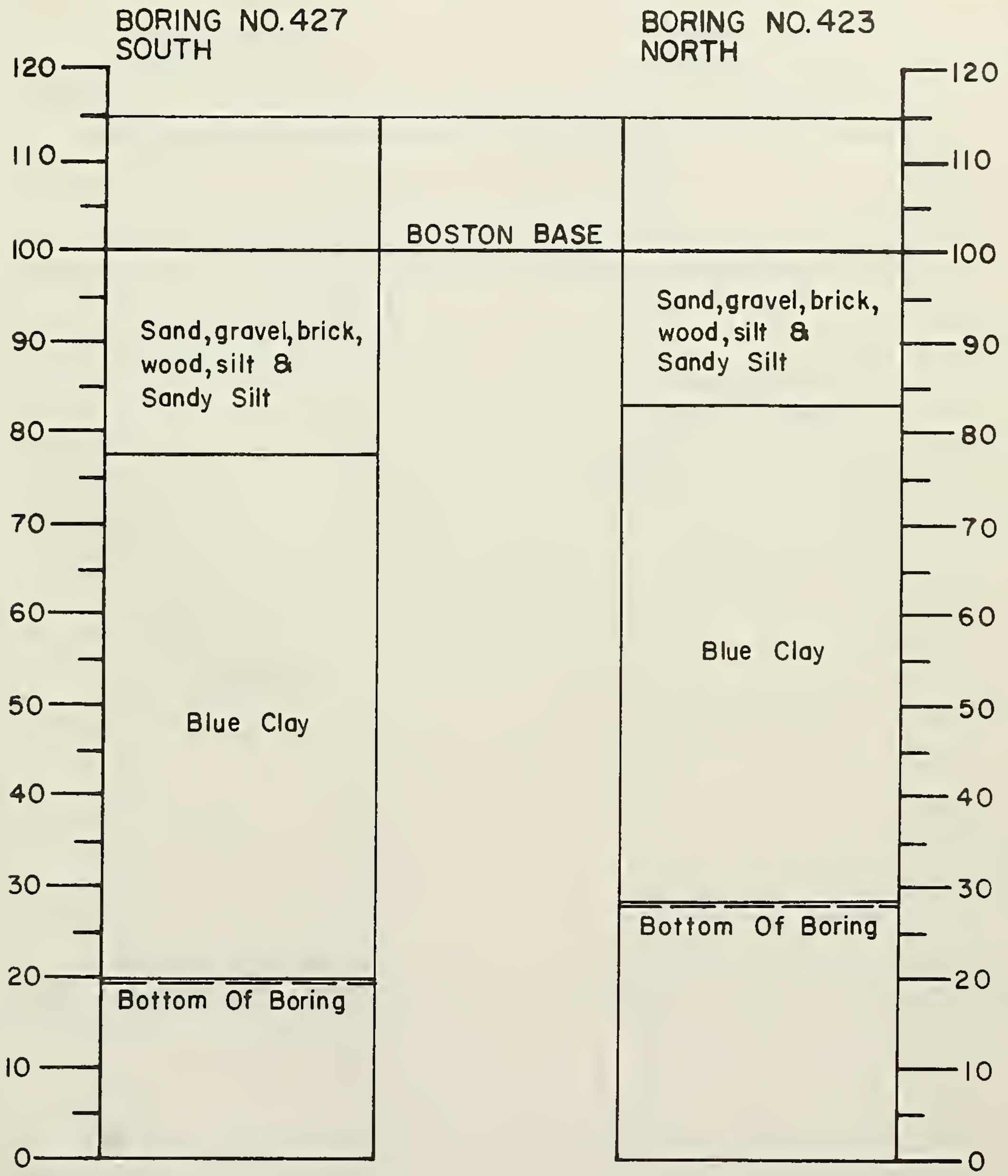
DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION
BORING DATA
TAKEN FROM PLAN TITLED
LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL
AT LONG WHARF

VERT. SCALE: 1" = 20'

DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION

BORING DATA

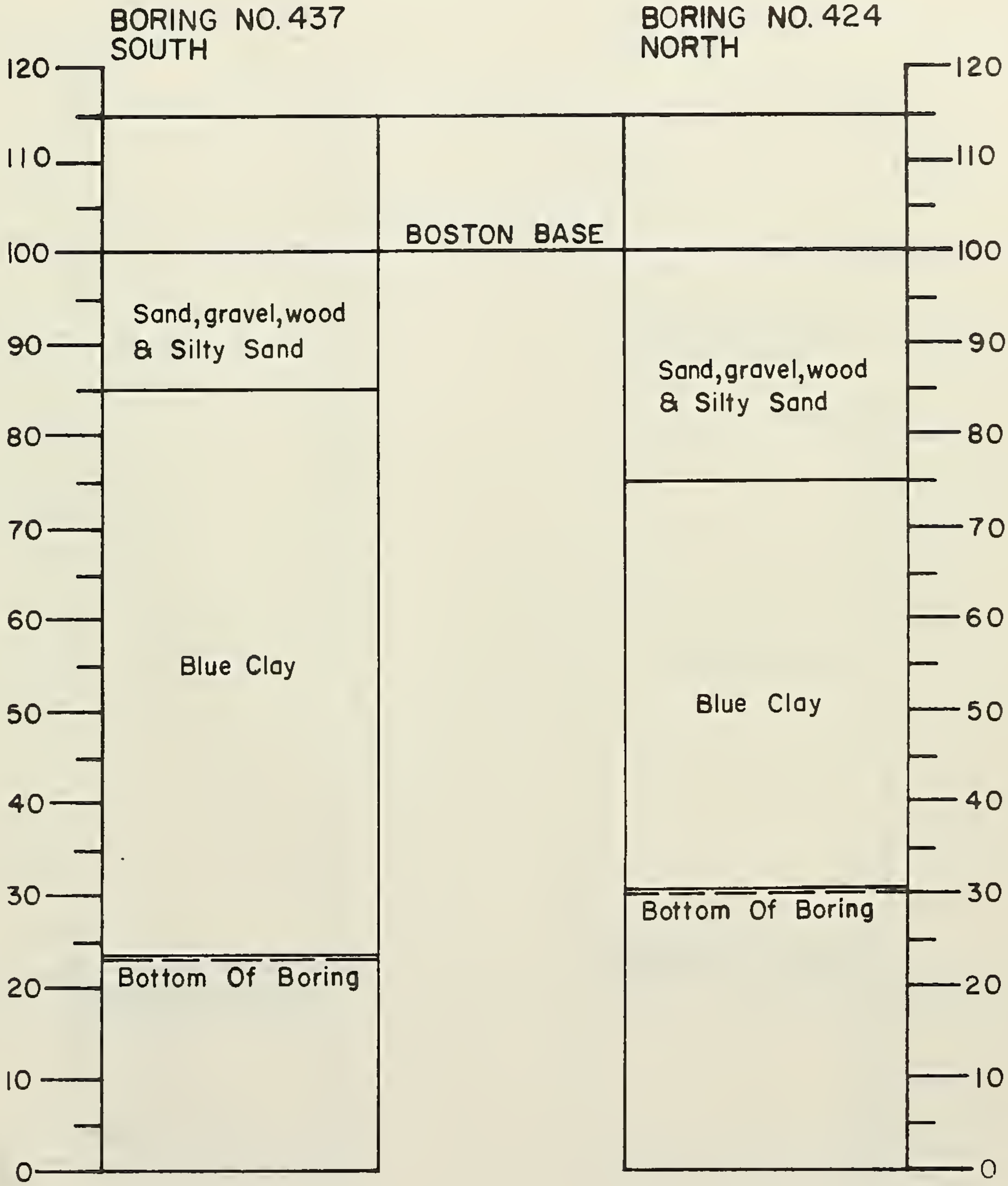
TAKEN FROM PLAN TITLED

LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL

AT LONG WHARF

VERT. SCALE: 1" = 20'

DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION

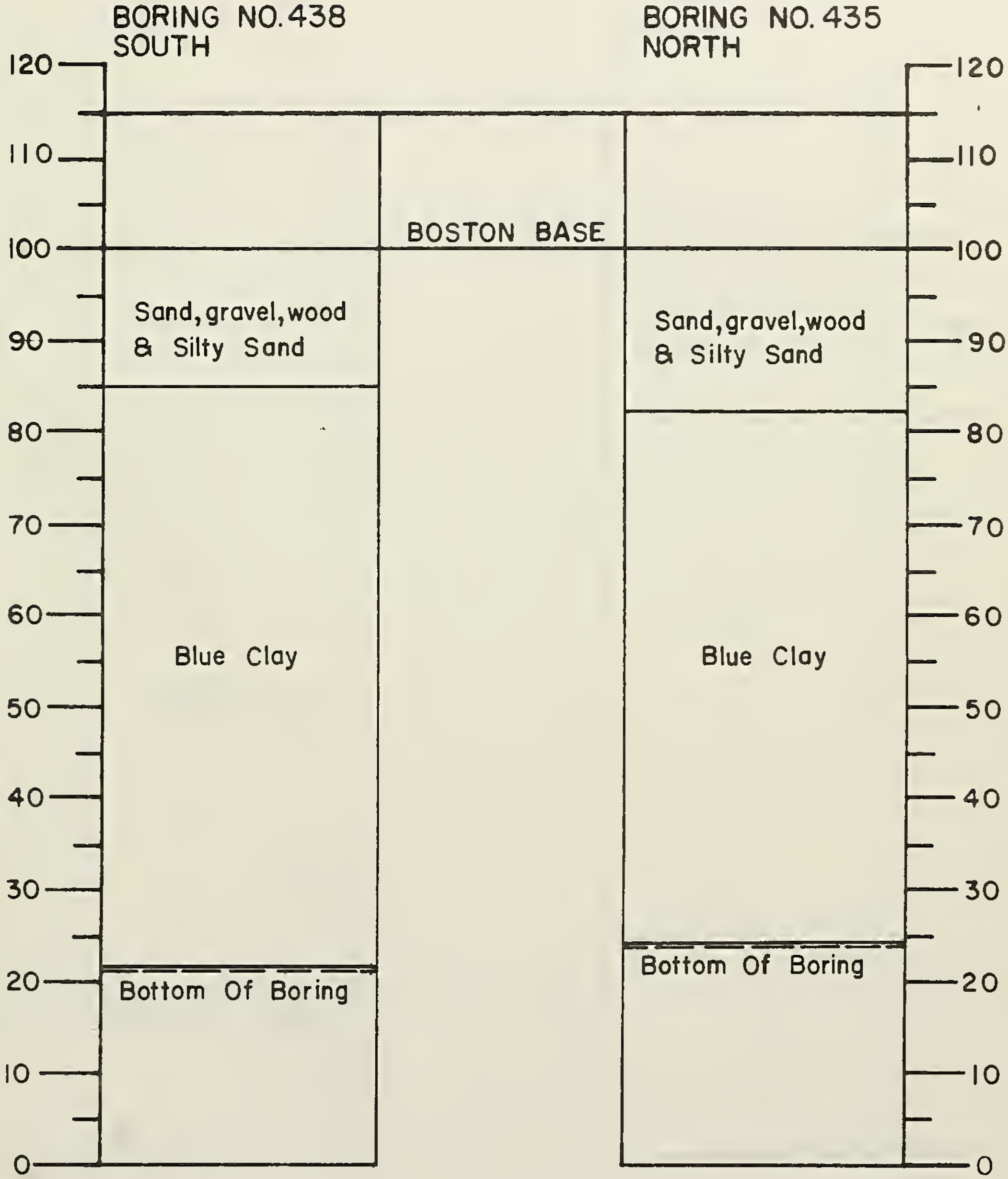
BORING DATA

TAKEN FROM PLAN TITLED

LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL AT LONG WHARF

VERT. SCALE: 1" = 20'

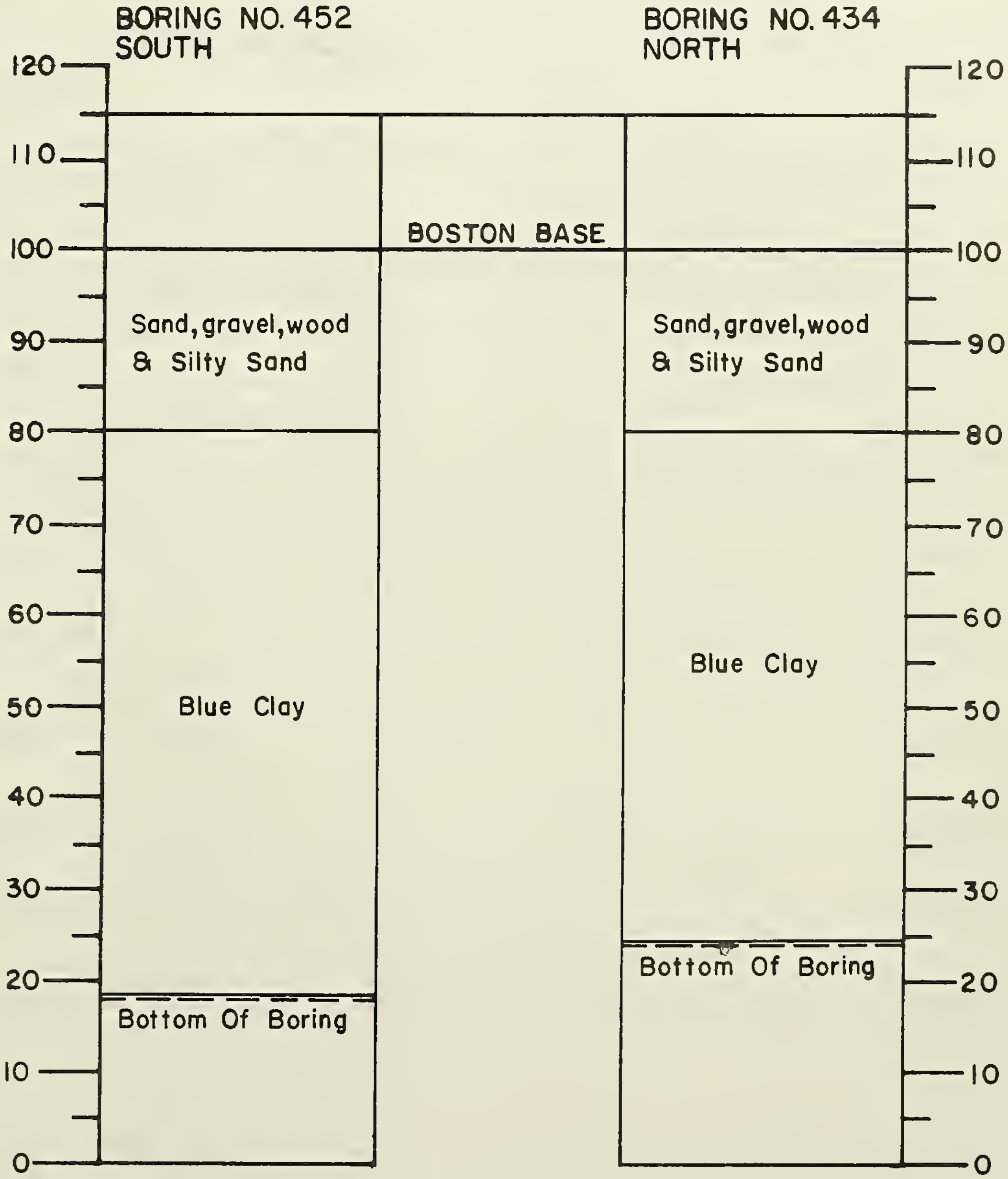
DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION
BORING DATA
TAKEN FROM PLAN TITLED
LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL
AT LONG WHARF

VERT. SCALE: 1" = 20'

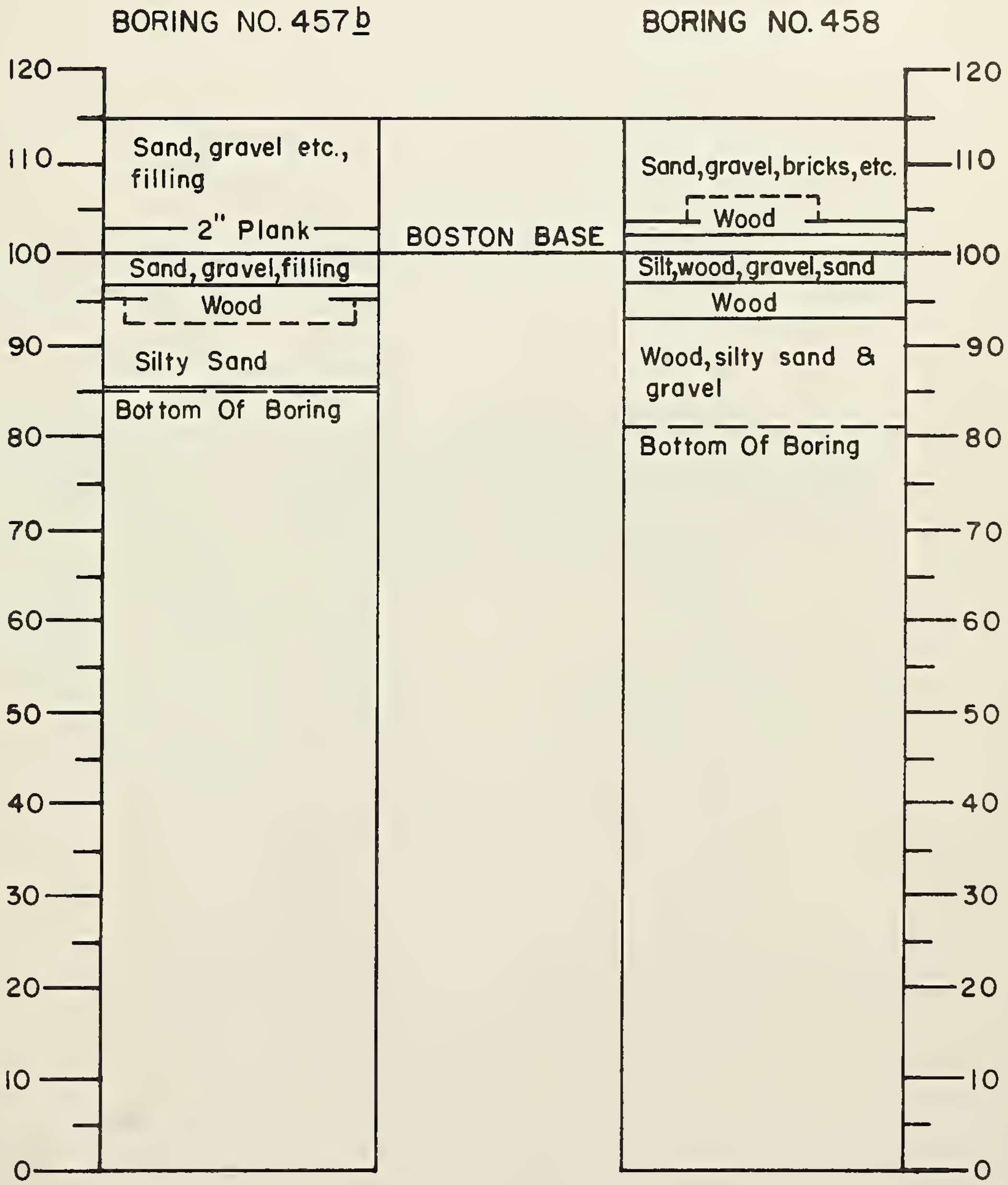
DATED 6, DEC. 1906



BOSTON TRANSIT COMMISSION
BORING DATA
TAKEN FROM PLAN TITLED
LONGITUDINAL SECTION ON ℄ OF EAST BOSTON TUNNEL
AT LONG WHARF

VERT. SCALE: 1" = 20'

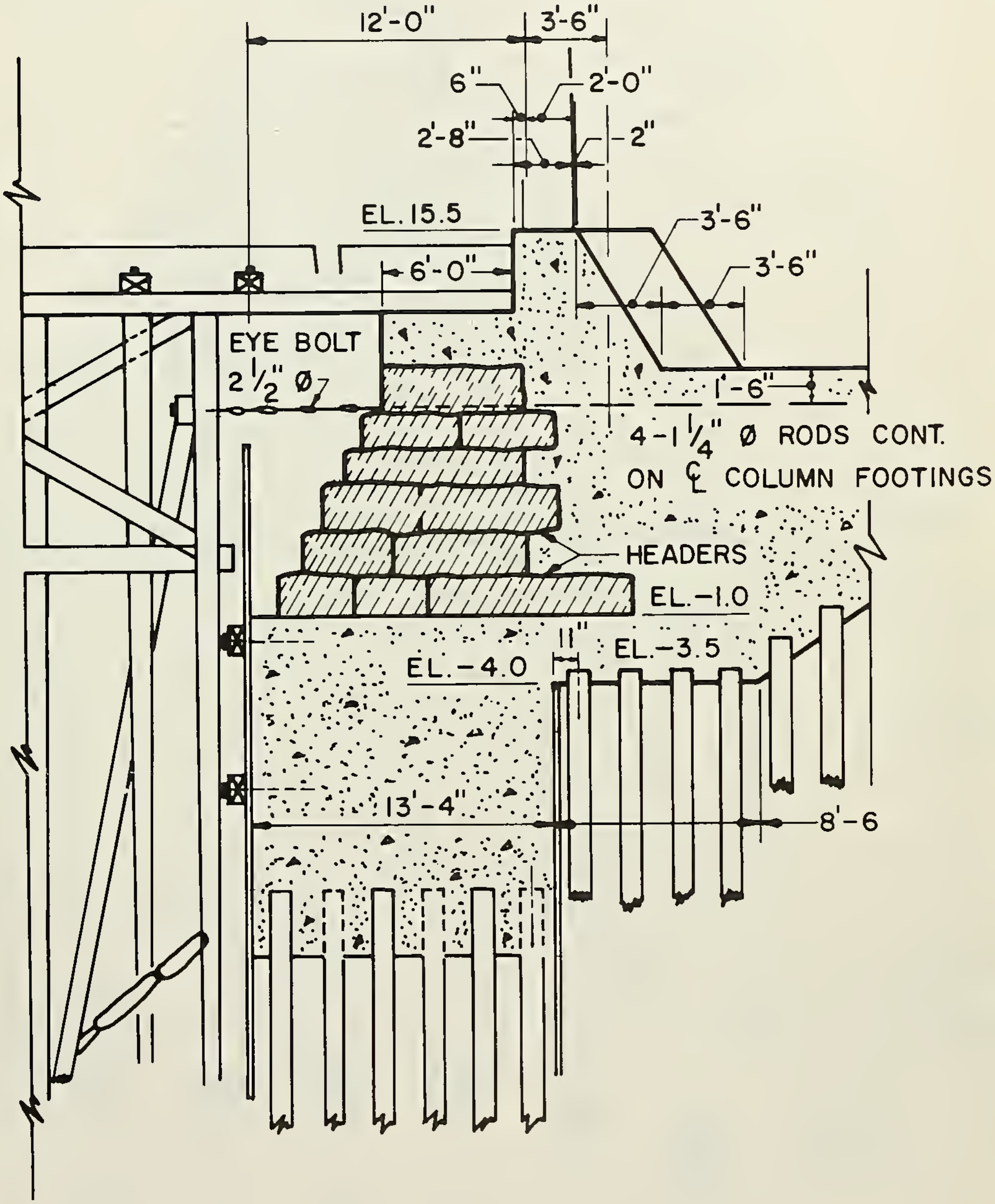
DATED 6, DEC. 1906



C. EXISTING CONDITIONS

IV. EXISTING KNOWN WALL CROSS SECTIONS

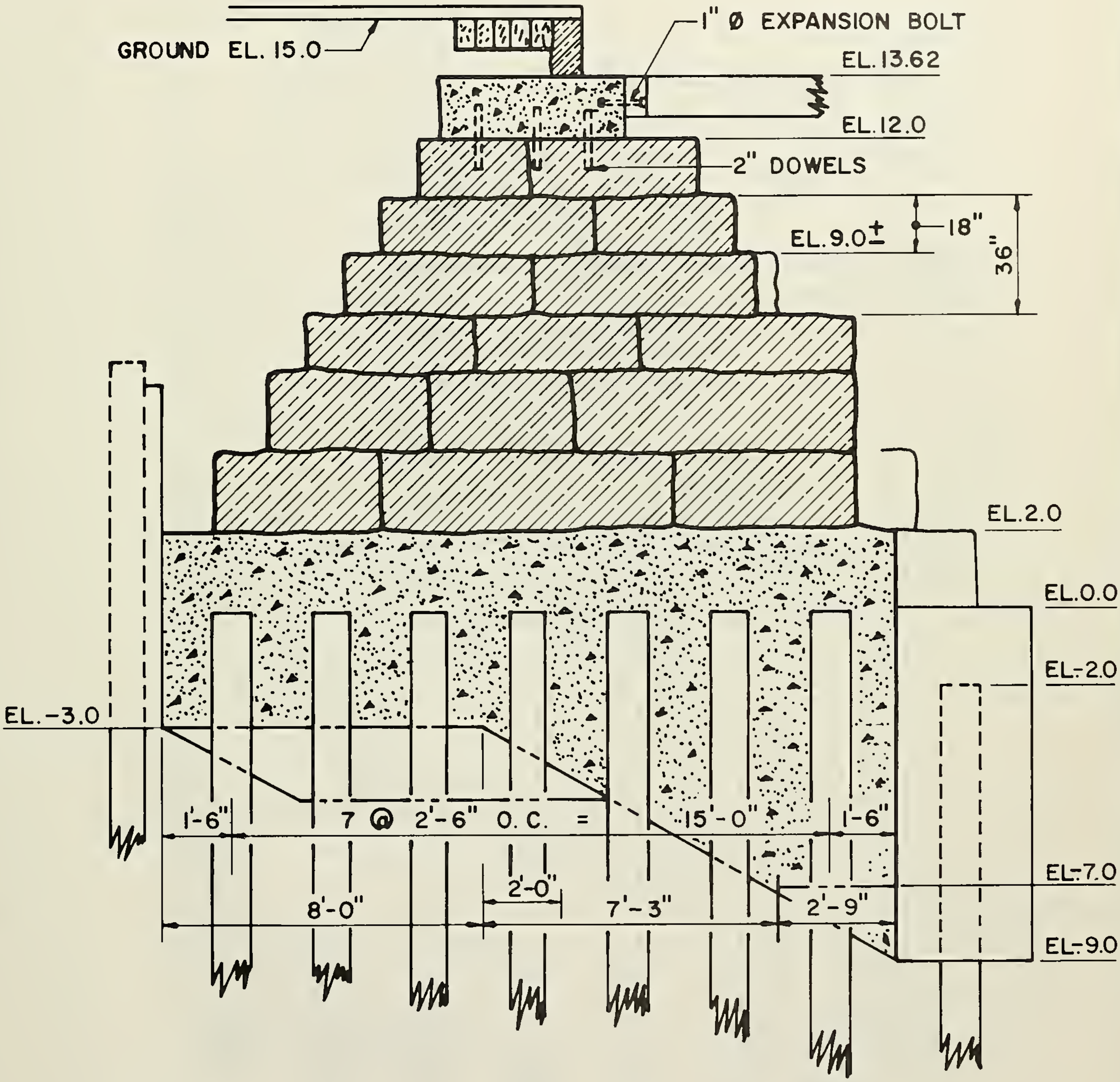
DRAWINGS D, E AND F



SECTION B-B

DRAWING D

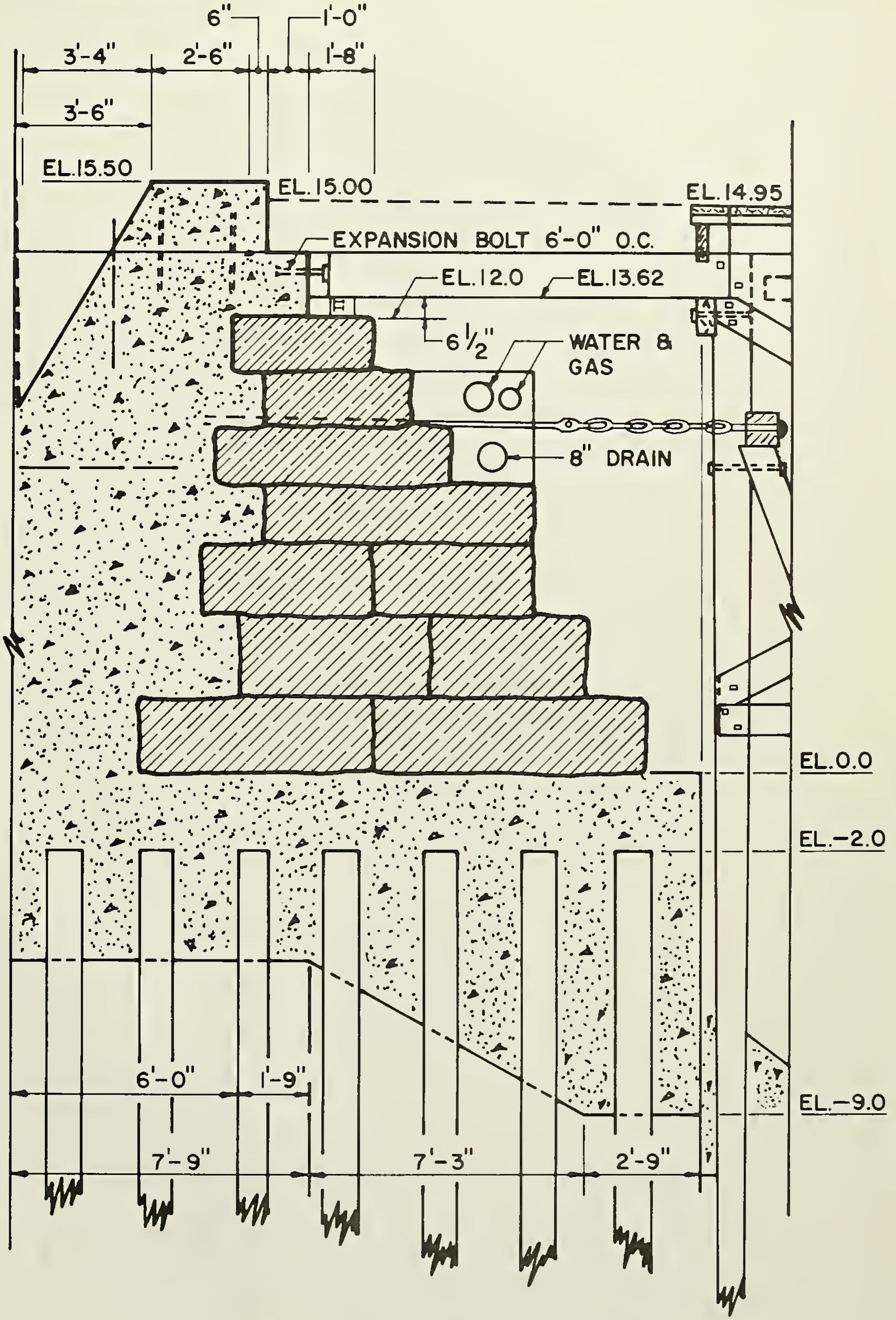
(SEE DWG. C Pg.22)



SECTION C-C

DRAWING E

(SEE DWG. C Pg.22)



SECTION D-D

DRAWING F

(SEE DWG. C Pg.22)

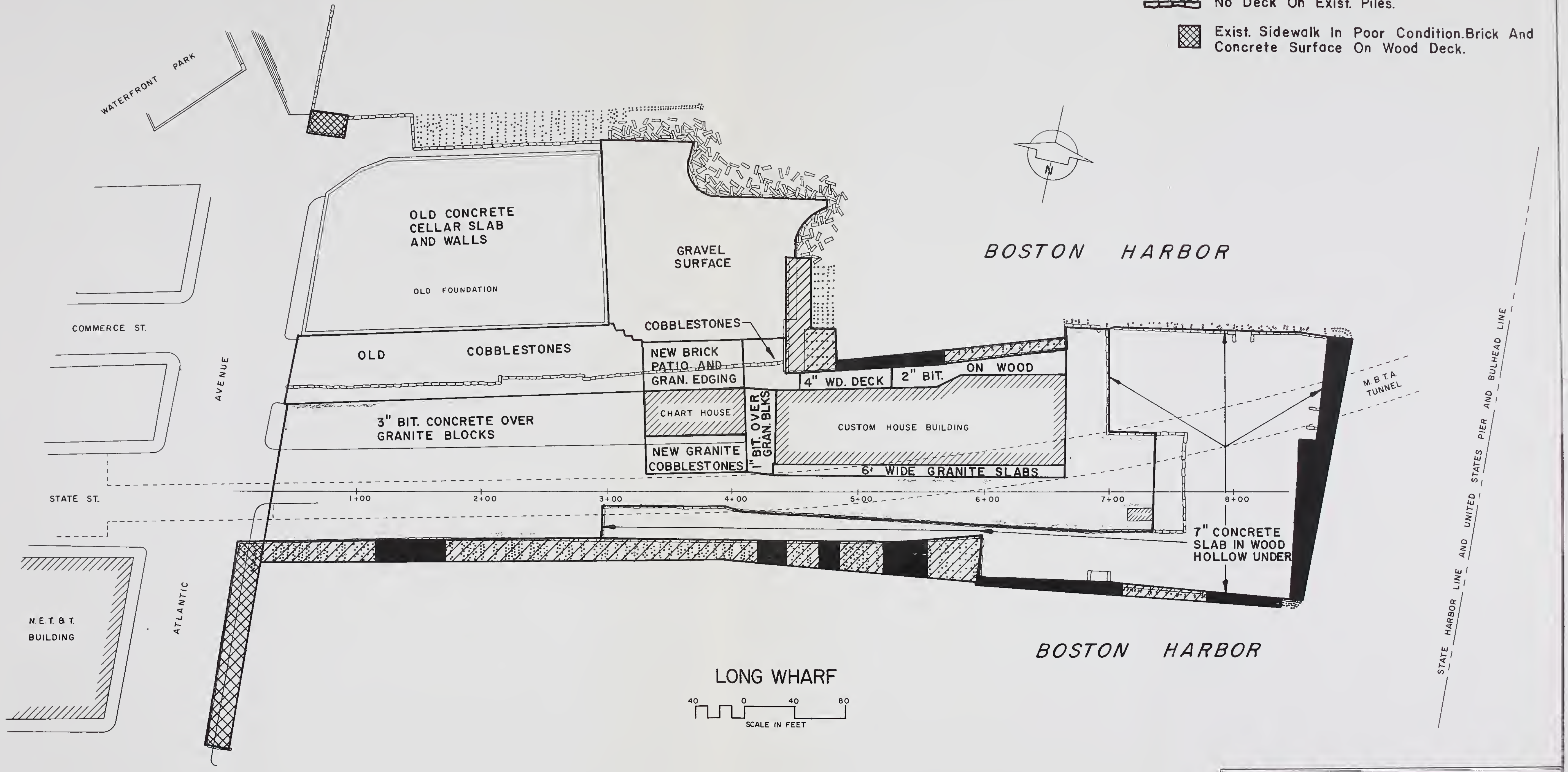
C. EXISTING CONDITIONS

V. EXISTING PAVEMENTS AND DECK CONDITIONS

DRAWING G

LEGEND

- ■ Exist. Wood Deck In Poor Condition.
- ▨ Exist. Wood Deck In Fair Condition.
- No Deck On Exist. Piles.
- ▩ Exist. Sidewalk In Poor Condition. Brick And Concrete Surface On Wood Deck.



DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS. R-77

LONG WHARF
EXTERIOR WOOD DECK CONDITIONS &
INTERIOR SURFACE TREATMENTS

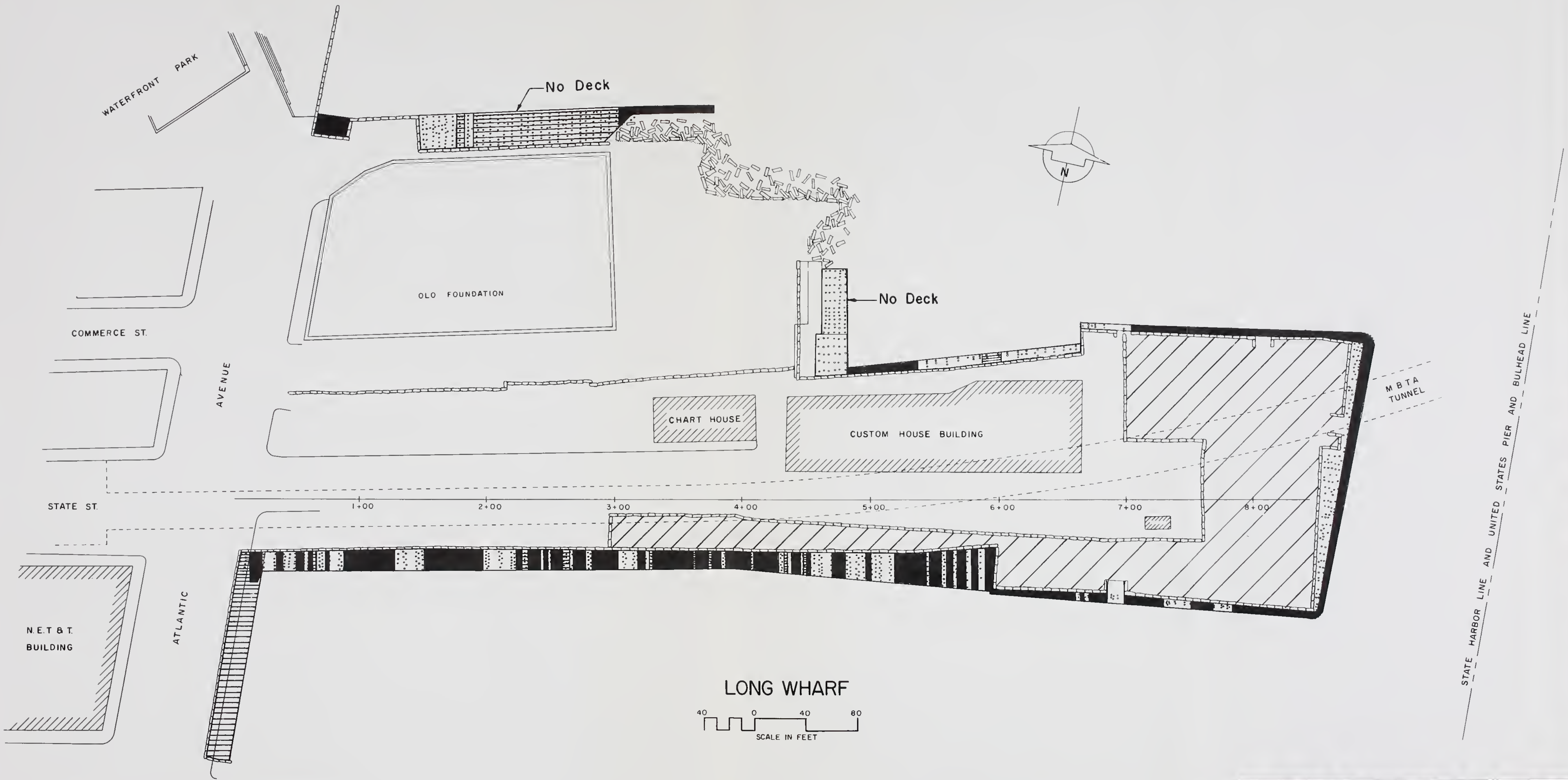
BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE: 4 MAY 76	DRAWING No. G
DIR. OF ENGINEERING	SCALE: AS NOTED	REVISED

C. EXISTING CONDITIONS

VI. EXISTING PILING CONDITIONS

DRAWING H



LEGEND FOR EXIST. PILE CONDITIONS

- ☐ GOOD
- ▤ FAIR
- ■ POOR
- ▨ POOR (INTERNAL PILES)

NOTE: Data From Visual Field Inspection
October 3, 1975

DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS R-77

LONG WHARF
EXIST. CONDITIONS OF PILES & OUTER PIERS

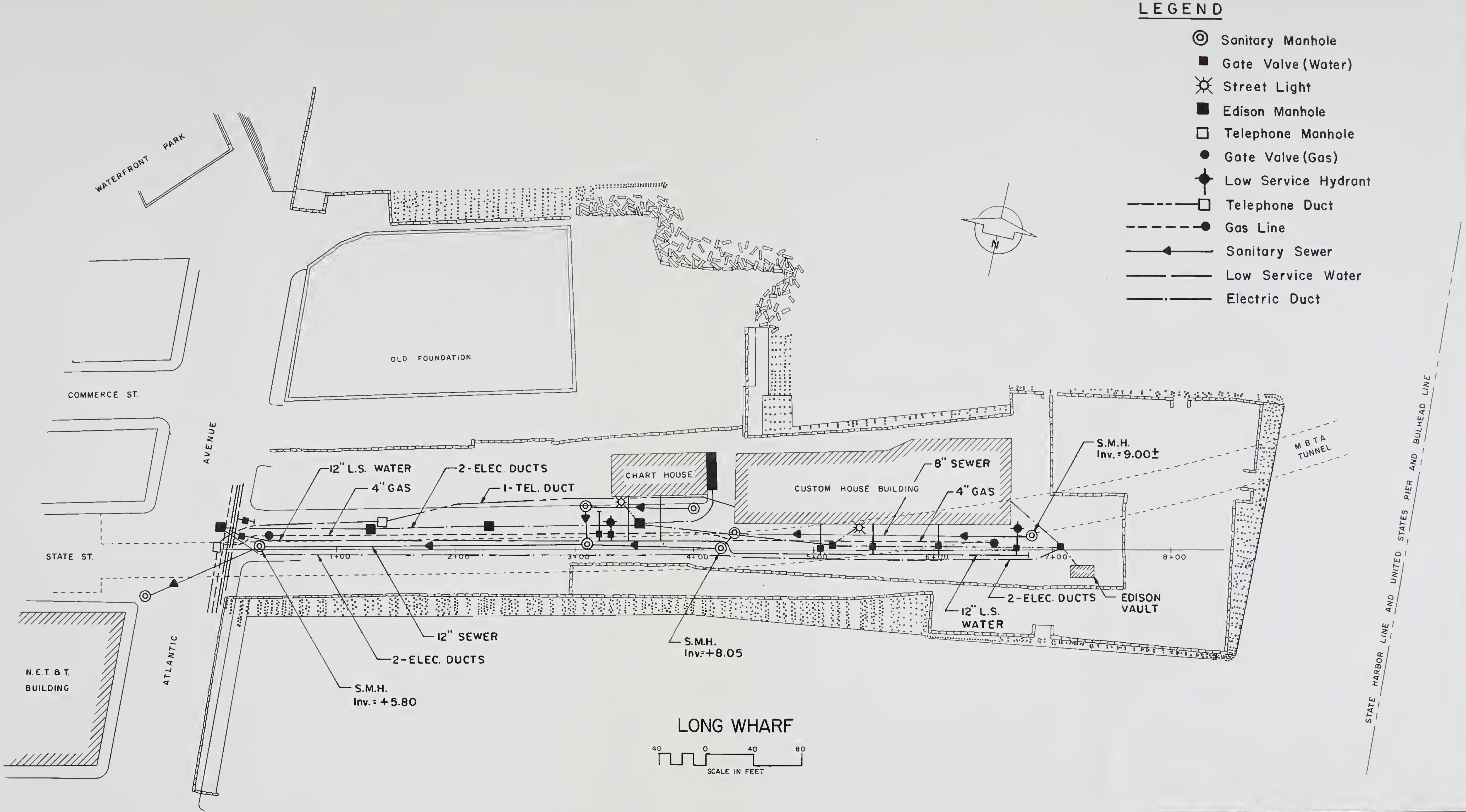
BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No H
DIR OF ENGINEERING	SCALE AS NOTED	REVISED

C. EXISTING CONDITIONS

VII. EXISTING UTILITIES

DRAWING J



NOTE: Catch Basins Not Shown. All Catch Basins, Scuppers And Drop Inlets Flow Directly To harbor.

DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS R-77

LONG WHARF
EXISTING UTILITIES

BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No J
DIR OF ENGINEERING	SCALE AS NOTED	REVISED

D. ASSUMED CONTAINER WALL CROSS SECTION

A typical cross section is shown on the following page which indicates the most probable type of foundation under the outer seawalls of Long Wharf. This assumption is based on several facts. Boring number 86 shows that rock was cored thru the seawall from elevation +5.68 to elevation -21.33. This indicates that some sort of granite foundation exists at very low elevations. The boring also indicates that at lower levels voids filled with silt occur and are usually less than one foot thick. This fact shows that some sort of dumped rock exists. Soundings were taken at the outside face of the seawall and indicate that a vertical face exists to elevation -20 at the deepest point. In order to maintain a vertical face, some kind of container wall would have to exist. Recent excavations on Old Atlantic Avenue at Long Wharf and demolition of "T" Wharf uncovered wooden cribs filled with rock.

The seawall was built in the seventeen hundreds and at that time sheet piling or cofferdams did not exist. Therefore, it is likely that wooden cribs were assembled on shore, floated into position and sunk with large rocks. The rock-filled cribs were allowed to displace the silt, and another crib was added to the top. Settlement occurred until the cribs eventually rested on the first stable layer of clay. This stiff clay layer can be found under Long Wharf at about elevation -30.

It is very unlikely that a pile foundation exists under the outer walls. The fill in back of the walls could not be contained. The fill

D. ASSUMED CONTAINER WALL CROSS SECTION

would eventually wash out thru the piles and failures would have occurred. Failures have not occurred on Long Wharf over the years and the wall has held for more than two hundred years. This is because the wood cribs are always below water.

Section B, "History of the Site", of this Report indicates that this type of construction was common practice in 1700.

The sketch shown on the following page is an assumption and is not to be used for design. It is intended to indicate the probable wall section, and not the actual true section.

JOB LONG WHARF FOUNDATION STUDY

SHEET NO ______ OF ______

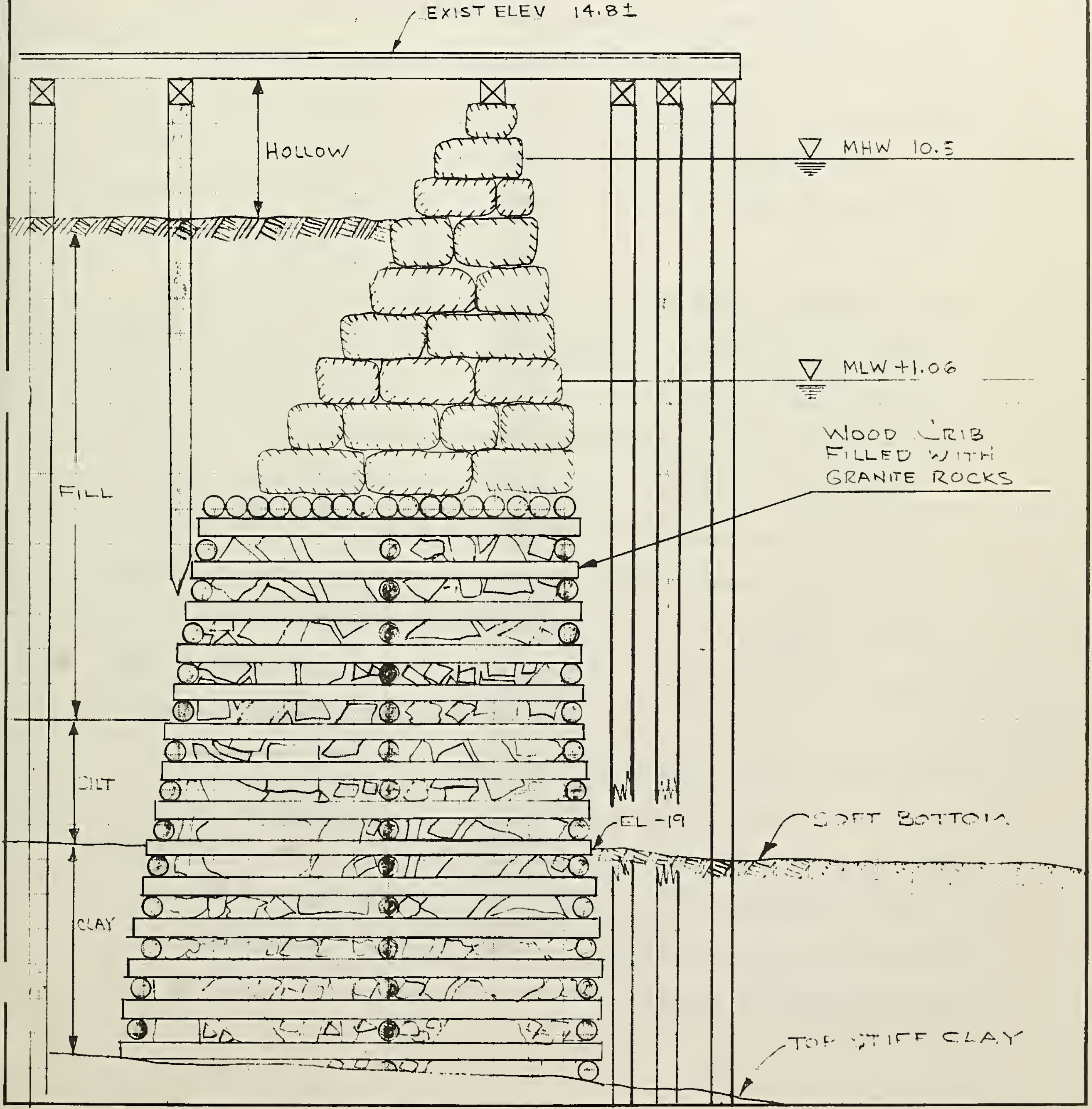
SCHOENFELD ASSOCIATES, INC.
Consulting Engineers

CALCULATED BY JCD DATE 20 APRIL 1976

CHECKED BY WAM DATE 20 APRIL 1976

SCALE NONE

D. ASSUMED CONTAINER WALL CROSS SECTION



FORM 204 Available from NEBS INC. Townsend, Mass 01469

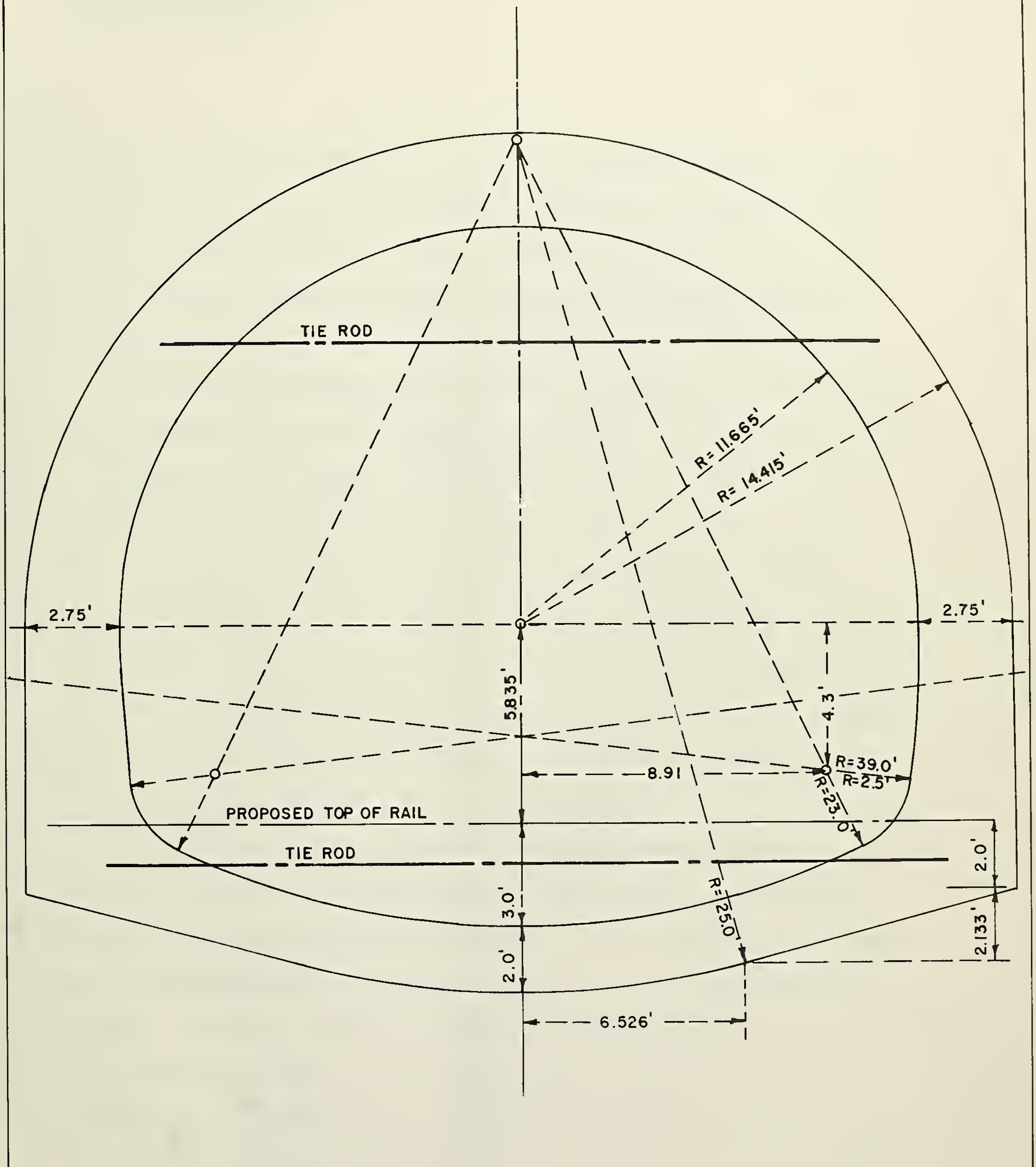
E. SITE LIMITATIONS

I. Massachusetts Bay Transportation Authority Subway Tunnel

One of the major obstacles to be considered in any proposal of new work on Long Wharf is the Massachusetts Bay Transportation Authority subway tunnel. The tunnel passes directly under Long Wharf in an east-west direction. The elevation of the top of the tunnel at Atlantic Avenue is about minus twenty-two and at the easterly end of the Wharf, about minus forty-six, Boston City Base Elevation.

The facility was constructed around 1900 and passes through a rather homogeneous strata of blue clay. The method of construction was probably the pressure tunnel method. It is considered to be the oldest pressure tunnel still in operation in the United States. A typical cross-section is shown on the following page. The section is constant and does not vary under the entire length of Long Wharf. The tunnel was originally designed to carry streetcars from downtown Boston, under Boston Harbor to East Boston. In 1924, the system was converted to accommodate subway trains. Today, the line is very active and is known as the Blue Line of the Massachusetts Bay Transportation System.

According to officials of the Massachusetts Bay Transportation Authority, the tunnel was constructed by first placing a series of wooden liner plates against the excavated clay. The wood exterior liner was left in place and a wood form was constructed inside to provide for the thickness of the walls. Unreinforced concrete was placed between the outer liner plate and the inner forms. The concrete was allowed to cure and the inner forms were



TYPICAL SECTION
M.B.T.A. SUBWAY TUNNEL
UNDER
LONG WHARF

SCALE 1/4" = 1'-0"

removed. The tunnel acts as a ring in total compression caused by the inward forces of the surrounding clay. The shell of the tunnel was constructed completely without steel reinforcing in the walls or floor. In 1924, concrete falsework and minor steel reinforcing were added during the remodeling.

The records and drawings of the tunnel are on file at the Massachusetts Bay Transportation Authority offices in Charlestown. During the investigation, it was discovered that many of the detailed drawings in the vicinity of Long Wharf were listed in the various index books, as destroyed. There were no reasons stated as to why these plans were destroyed, however, many general overall plans are still on record and were used to prepare this Report. There are records of a vertical underground easement that is shown on the Massachusetts Bay Transportion Authority's plans, however, no horizontal easements were discoverd. The vertical easement is shown on the enclosed Soils Profile of Long Wharf drawing.

The bottom of the container walls around Long Wharf should fall in close proximity to the top of the tunnel. The existing wood piles that support the exterior and interior decks are probably driven to an elevation that falls below the top of the tunnel roof. It is not known how far down the piles were driven, however, it is very possible that when the tunnel was constructed in 1900, these wooden piles were encountered. It is probable that the tunnel passed within ten (10) feet of the bottom of the cribbing that is supporting the seawalls. These assumptions are not based on actual recorded data; they are meant to indicate the probable conditions

that would be uncovered after extensive investigations. These conditions should be discussed and considered in any future plans to develop the Wharf.

It is possible that excessive additional loadings on existing pilings or seawalls could transfer loads to the tunnel below. Of particular concern are the piles directly over the tunnel and the areas where the seawalls intersect the tunnel. Extreme care and careful analysis should be made before additional vertical loadings are proposed.

E. SITE LIMITATIONS

II. HIGH TIDES AND STORM DATA

LONG WHARF BOSTON

Highest Tides Experienced

During a conference on September 27, 1961, at the Waltham Office of the Corps of Engineers, Representatives of the Corps stated that a review of reported elevations of high water dating back to the first part of the eighteenth century led them to the conclusion that 15.8 feet above BCB has been the probable maximum high water experience by Boston. This is 5-1/2 feet above mean high tide in Boston. Printed records of the U.S. Department of Commerce, Coast and Geodetic Survey, confirm the conclusion of the New England Division of the Corps of Engineers.

Copied monthly high tides for the period of 1921 through 1960 from handwritten sheets in the Coast and Geodetic Survey Office show that during that forty-year period, the tide has been at El. 14 above BCB seven times. Only once during this period did the tide reach El. 15. That was during the northeast storm of December 29, 1959, at which time the tide was at its highest since the Christmas Gale of December, 1909, and was the fourth highest tide on record for this area.

There have been other hurricanes and northeast storms which have caused more damage to the New England area in general. However, the storm of December 29, 1959, is the most appropriate one for the purpose of our analysis.

The New England Division of the Corps of Engineers, Waltham, Massachusetts, prepared a Resume Report, dated February 19, 1960, on the storm of December 29, 1959, in the Coastal Region of New England. The summary of that report states, "A general eastward movement of the storm caused the winds to moderate before the time of high tide, so that wave action was not severe...The damages in the December 29 storm were more from flood water and less from wave action than in the usual three day northeaster!"

The Report further states that, "Boston Harbor was described as 'calm as a mill pond' at the time of high water."

Damages to Waterfront Area

The scope of the aforementioned Report states that, "Storm damage information for the Report was obtained from field inspections immediately after the storm, contacts with local people and newspaper accounts. Estimates of damage are approximate for some areas."

Damages to Boston, Massachusetts, are described on Page 20 of the Report and are accompanied by several photographs of flooding on Atlantic Avenue near State Street and on the wharves in the Atlantic Avenue and Northern Avenue areas. Depth of water on the wharves ranged from a few inches to 2 or 3 feet. Depth of water on Atlantic Avenue was minor; but it was sufficient to overflow the foot of State Street (the lowest area of Atlantic Avenue), and the entrance to the subway station was awash.

A large number of buildings were in the flooded sector, but damage was kept to a minimum by use of sump pumps in basements. Incoming tides

trapped hundreds of motor vehicles on wharves, on parking lots and on city streets. Extensive power and telephone interruptions occurred along the flooded area.

Another factor to be considered in any tidal flooding study is the wave height and damage. However, we must recognize that the Waterfront redevelopment area is a relatively sheltered one due to the barrier effect created by the presence of Long Island, approximately 5 miles distant. From this point there is a very narrow straight passage to the waterfront area, which strictly limits the direction from which the wind can act to create maximum height of waves.

Mr. J.B. McAleer on September 27, 1961, and Mr. Vanderhoeff on October 15, 1963, (both Representatives of the New England Division of the Corps of Engineers) estimated the maximum height of wave at 3.5 to 4 feet from trough to crest. We have calculated this height to be 4.4 feet for a sustained wind of 80 miles per hour (Severe hurricane conditions) and 3.2 feet for a sustained wind of 35 miles per hour (Severe northeast storm). The formula we used for the calculations was developed by Mr. D.A. Molitor and reported in the transactions of the American Society of Civil Engineers.

According to Mr. Molitor, however, empirical formulas are much less satisfactory than actual observations for a particular site because of the strong influence of local conditions. Discussion with representatives of the Boston Pilots' Association indicates that the highest waves normally expected in the inner Harbor are 1.5 to 2 feet from trough to crest; they can go higher in a "whole gale" and were observed as high as 3 feet during the 1938 hurricane "when the wind was 125 mph".

Another factor to be considered is the change in sea level. The data contained herein indicates that since 1930, the sea level has been rising at the rate of 0.02 feet per year, whereas, the rate before that time had been less than 0.01 feet per year.

Conditions are most favorable for high flood tides where a storm coincides with a period of maximum astronomical tides (i.e. "spring tides", or when the tide is normally expected to be very high due to the relative positions of the sun, moon and earth). This was the condition which existed on December 29, 1959. The recorded high water level of 15.0 during the northeaster storm on that day was about 4.7 feet above mean high water level and 2.3 feet above the predicted spring high water.

One hundred twelve years of records show that Boston has never experienced tides over 15.8 feet above BCB. Rarely, if ever, is a protective installation such as this designed for conditions which occur less frequently than once in 100 years.

With all the worst conditions occurring at the same time, it is possible that the water could rise higher than ever recorded. However, we feel that the probability of this happening is extremely small. Waves would be at their highest during Northeasters, but even then, the possibility of the maximum height being realized is small due to the restricted passage from Long Island. The configuration of the wharf area is such that the problem of run-up of waves is virtually non-existent. There is no indication in the records of wave action contributing to flood damage.

Based on information obtained during a telephone conversation with the U.S. Weather Bureau relative to sustained winds experienced in this area during northeast storms, and on estimates provided by the Corps of Engineers relative to maximum storm tides, we conclude that the maximum storm tide which would, within reasonable probability be experienced in this area is 3 to 4 feet above predicted astronomical tide.

LONG WHARF BOSTON

TABLE 1

HIGHEST YEARLY TIDES 1921-1960

* All Elevations Refer to Boston City Base

YEAR	MEAN MONTHLY HIGH TIDE	HIGHEST TIDE	ABOVE M.H.W.
1921	12.33	13.4	3.1
1922	12.34	13.1	2.8
1923	12.33	12.8	2.5
1924	12.46	12.9	2.6
1925	12.11	12.6	2.3
1926	12.33	13.4	3.1
1927	12.49	13.1	2.8
1928	12.32	13.3	3.0
1929	12.32	13.2	2.9
1930	12.19	12.9	2.6
1931	12.47	14.5	4.2
1932	12.36	13.4	3.1
1933	12.68	14.0	3.7
1934	12.37	12.8	2.5
1935	12.23	13.0	2.7
1936	12.35	13.4	3.1
1937	12.68	13.6	3.3
1938	12.61	13.6	3.3
1939	12.68	13.7	3.4
1940	12.80	14.6	4.3
1941	12.62	13.1	2.8
1942	12.57	13.2	2.9
1943	12.70	13.2	2.9
1944	12.72	14.5	4.2
1945	12.79	13.6	3.3
1946	12.62	13.4	3.1
1947	12.92	13.9	3.6
1948	12.71	13.5	3.2
1949	12.43	13.0	2.7
1950	12.62	13.6	3.3
1951	12.80	13.3	3.0
1952	12.65	13.9	3.6
1953	12.82	13.8	3.5
1954	12.75	13.9	3.6
1955	12.87	13.7	3.4
1956	12.88	14.3	4.0
1957	12.70	13.3	3.0
1958	13.08	14.2	3.9
1959	12.94	15.0	4.7
1960	13.03	13.8	3.5

HIGH WATER DATA

TABLE 2

Copied* from Printed Records
in the

U.S. Coast and Geodetic Survey Office

Custom House, State Street, Boston, Mass.

October 14, 1963

* The elevations shown here have been converted to height above Boston City Base

Boston Storm High Waters

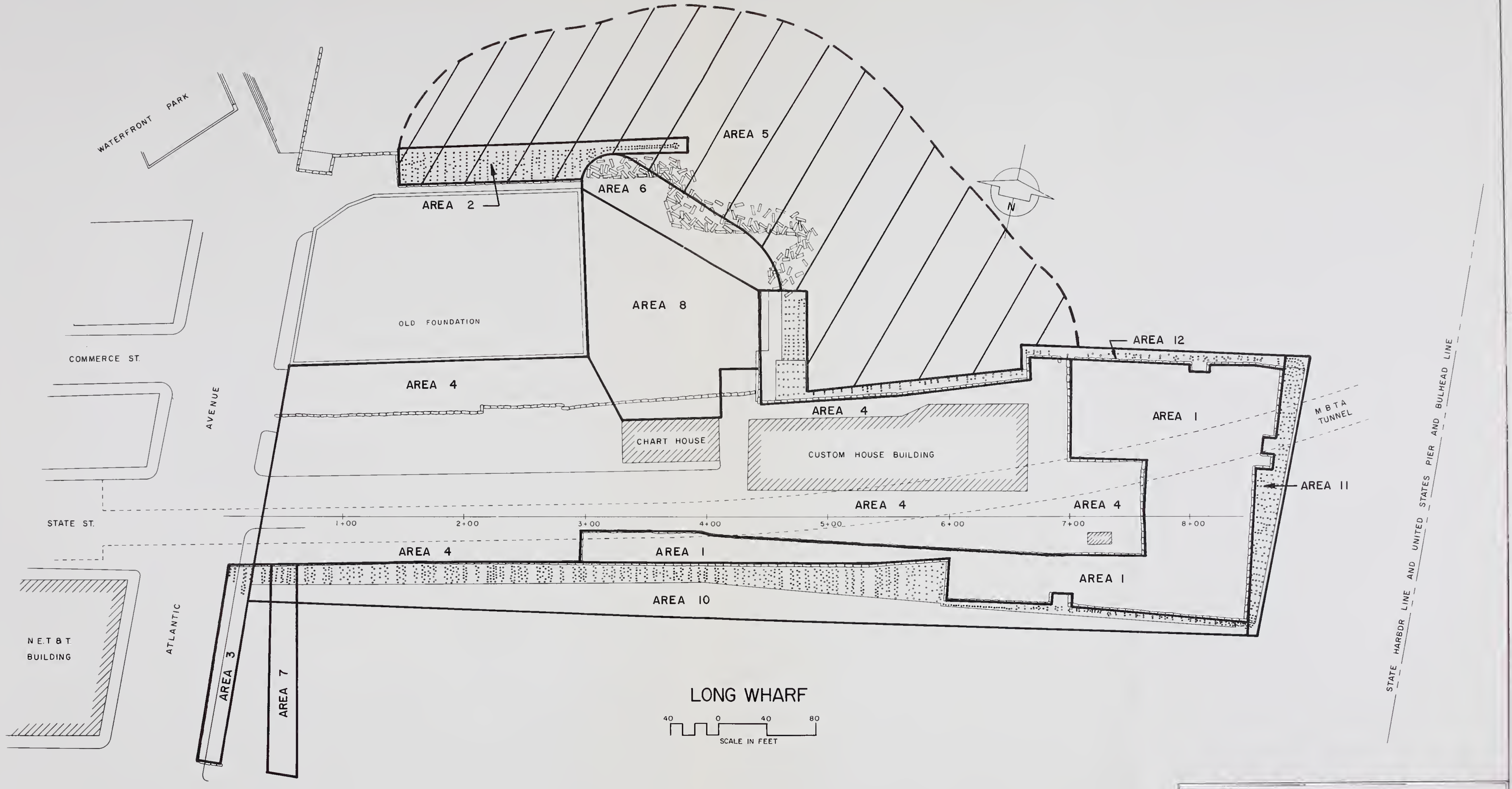
February 24, 1723	16.8 (guess estimate)
April 16, 1851 (Minots Ledge Storm)	15.8 (recorded - Navy Yard)
December 29, 1853	14.6
November 26, 1898 (Portland Gale)	15.1 (estimated)
January 25, 1905	14.6
December 26, 1909 (Christmas Gale)	15.6
April 21, 1940	14.6
December 29, 1959	15.0

Hurricanes

September 23, 1815	15.8 (guess)
September 21, 1938	12.1
September 14, 1944	12.3
September 11, 1950	13.6
August 31, 1954	13.9 (Carol)
September 11, 1954	11.8 (Edna)
August 17, 1955	12.4 (Diane)
September 12, 1960	12.5 (Donna)

F. RECOMMENDATIONS AND ESTIMATED COSTS

DRAWING L



DOWNTOWN WATERFRONT FANEUIL HALL PROJECT
MASS R-77

LONG WHARF
AREA PLAN

BOSTON REDEVELOPMENT AUTHORITY
BOSTON - SUFFOLK COUNTY - MASSACHUSETTS

	DATE 4 MAY 76	DRAWING No L
DIR OF ENGINEERING	SCALE AS NOTED	REVISED

F. RECOMMENDATIONS AND ESTIMATED COSTS

I. Proposed Demolition Costs

a. Area 1 - Existing Concrete Deck East End Long Wharf

The work shall consist of the demolition and removal from the site of the entire 7" thick concrete slab and the removing and stacking of reuseable wooden floor joists and stringers. The existing supporting wooden piles shall be left in place.

Area = 40,960 Sq. Ft. 7" Thick Unreinforced Concrete

40,960 Sq. Ft. x \$2.00/Sq. Ft. = \$81,920.00

TOTAL COST = \$81,920.00

b. Area 2 - Remove Existing Wood Piles, North Side

The work shall consist of the removal of all wood piles presently in place along the north seawall of Long Wharf from Station 1+50 to Station 3+90, 300 feet left. The work shall include the removal and off-site disposal of the old piles.

Piles are to be cut off at the mud line as appropriate.

300 Piles ± x \$70.00/Pile = \$21,000.00

TOTAL COST = \$21,000.00

(See Drawing G, Page 84)
(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

I. Proposed Demolition Costs

c. Area 3 - Demolition of Existing Sidewalk and Pilings

The work shall consist of the demolition and off-site disposal of the existing brick, concrete and wood sidewalk in front of the telephone building. Included in the work shall be the cutting at the mud line of all wood piles and off-site disposal.

Deck	3,300 Sq. Ft.	x	\$2.00/Sq.Ft.	=	\$ 6,600.00
Piles	150 Piles	x	\$70.00/Pile	=	10,500.00
					\$17,100.00

TOTAL COST = \$17,100.00

d. Area 4 - Old Pavements Excavation

The work shall consist of the excavation and off-site removal of all old pavement courses to a depth of 18" below existing grade. Existing granite block pavers are to be removed and stacked for possible reuse as directed. The work includes all existing bituminous concrete pavement, concrete pavement, etc.

[79,800 Sq. Ft. x 1.5 Ft.]/27 C.F./C.Y. = 4,422 C.Y.

4,433 C.Y. x \$8.00/C.Y. = \$35,464.00

TOTAL COST = \$35,500.00

(See Drawing G, Page 84)

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

II. Area 5 - Proposed Dredging and Costs

The work shall consist of dredging the north side of Long Wharf to an elevation of -10.0. The purpose of the dredging shall be for future mooring facilities. The work shall consist of the excavation, transportation and off-site disposal of dredged materials. It should be noted that permits for dredging must be obtained from the Commonwealth of Massachusetts Division of Waterways and other applicable agencies. The location of spoil areas will be as directed and authorized.

$$\frac{100{,}000 \text{ Sq. Ft.} \times 10 \text{ Ft. Deep Avg.}}{27 \text{ Cy. Ft./Cu. Yd}} = 37{,}037 \text{ Cu. Yd.}$$

$$[\$8.00/\text{C.Y.}] \times [37{,}037 \text{ C.Y.}] = \$296{,}296.00$$

Say, $300,000.00

TOTAL COST = $300,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

III. Area 6 - Proposed Rip-Rap

The work shall consist of the construction of placed rip-rap and dumped rip-rap at the northeast corner of Long Wharf. The work shall include earth excavation, slope preparation and the placement of a three foot ordinary borrow bed to the low water line. It is assumed that the granite blocks necessary for the placed rip-rap are available on the site.

Common Excavation	3,000 C.Y.	@ $6.00	=	$18,000.00
Slope Grading and Preparation	900 S.Y.	@ $1.00	=	900.00
Dumped Rip-Rap	2,000 C.Y.	@ $20.00	=	40,000.00
Placed Rip-Rap	1,000 C.Y.	@ $30.00	=	30,000.00
				$88,900.00

Say, $90,000.00

TOTAL COST = $90,000.00

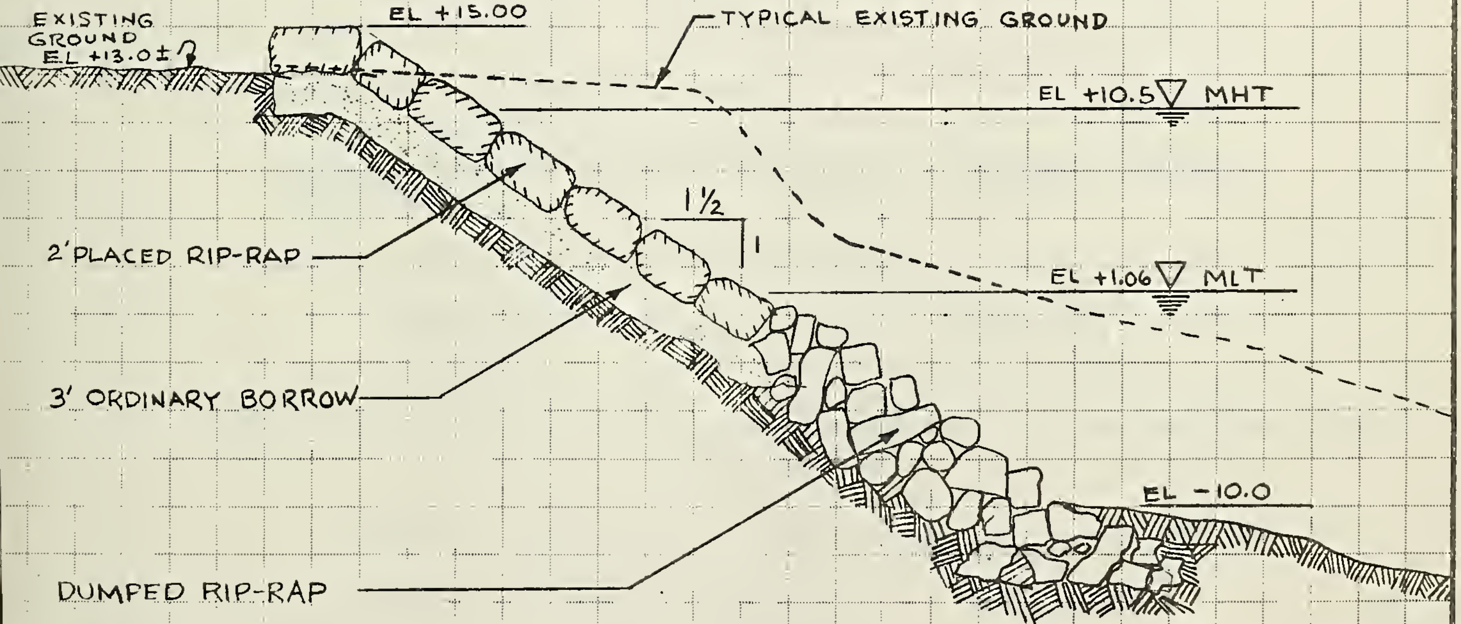
(See Drawing L, Page 104)

JOB 6070.
SHEET NO. OF Pg 109
CALCULATED BY JCD DATE 6 APRIL 1976
CHECKED BY WAM DATE 6 APRIL 1976
SCALE NONE

LONG WHARF FOUNDATION STUDY

F. RECOMMENDATIONS AND ESTIMATED COSTS

III AREA 6 - PROPOSED RIP-RAP



TYPICAL SECTION
AREA 6 PROPOSED RIP-RAP
(NOT TO SCALE)

NOTE: ALL ELEVATIONS REFER TO BOSTON CITY BASE

C I 204 Available from NEBS INC. Townsend, Mass 01469

F. RECOMMENDATIONS AND ESTIMATED COSTS

IV. Proposed New Seawalls

The work shall consist of the construction of granite block seawalls on Old Atlantic Avenue between Long Wharf and Central Wharf, and at the northeast corner of Long Wharf. The work shall include the excavation of silt to stiff clay, gravel backfill, concrete wall footings and stacked granite block walls. The estimated price is based on the East India Row Seawall constructed in 1968.

a. Area 6 - Construct Granite Block Seawall - Northeast Section Long Wharf

1968 - Contract B - East India Row Cost =

$$\frac{\$353{,}930.06}{250\text{ Ft.}} = \$1{,}415.72\ \ \$/\text{L.F.}\ \ (1968\text{ Price})$$

NOTE: Per Engineering News Record, Construction Cost Increase 1968 → 1976 = 114.4%

Therefore: 1976 Cost = 3,035.30 Dollars/Foot of Wall

220 Feet x 3,035.50 Dollars/Foot = $667,810.00

Say, $670,000.00

TOTAL COST = $670,000.00

b. Area 7 - Construct Granite Block Seawall - Central Wharf to Long Wharf

170 Feet x 3,035.50 Dollars/Foot = $516,035.00

Say, $520,000.00

TOTAL COST = $520,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

V. Rebuild Outer Decks Utilizing Existing Piles

The work shall include the rebuilding of existing wood piers and decking outside the seawall of Long Wharf. The areas considered include: Area 10, the entire south side; Area 11, the entire east side; and Area 12, about one-half the north side. For estimating purposes it is assumed that a pile bent will be rebuilt every ten (10) feet center to center. A new two (2) inch treated wood deck will be constructed. All major stringers, beams and timbers that are in satisfactory condition will be reused as directed. Piles that are to be utilized in the rebuilt bents will be cut off at an elevation that produces a full diameter of good wood as directed. Piles that are not utilized will be cut off at the mud line and discarded. (See sketch following page.)

(See Drawing L, Page 104)

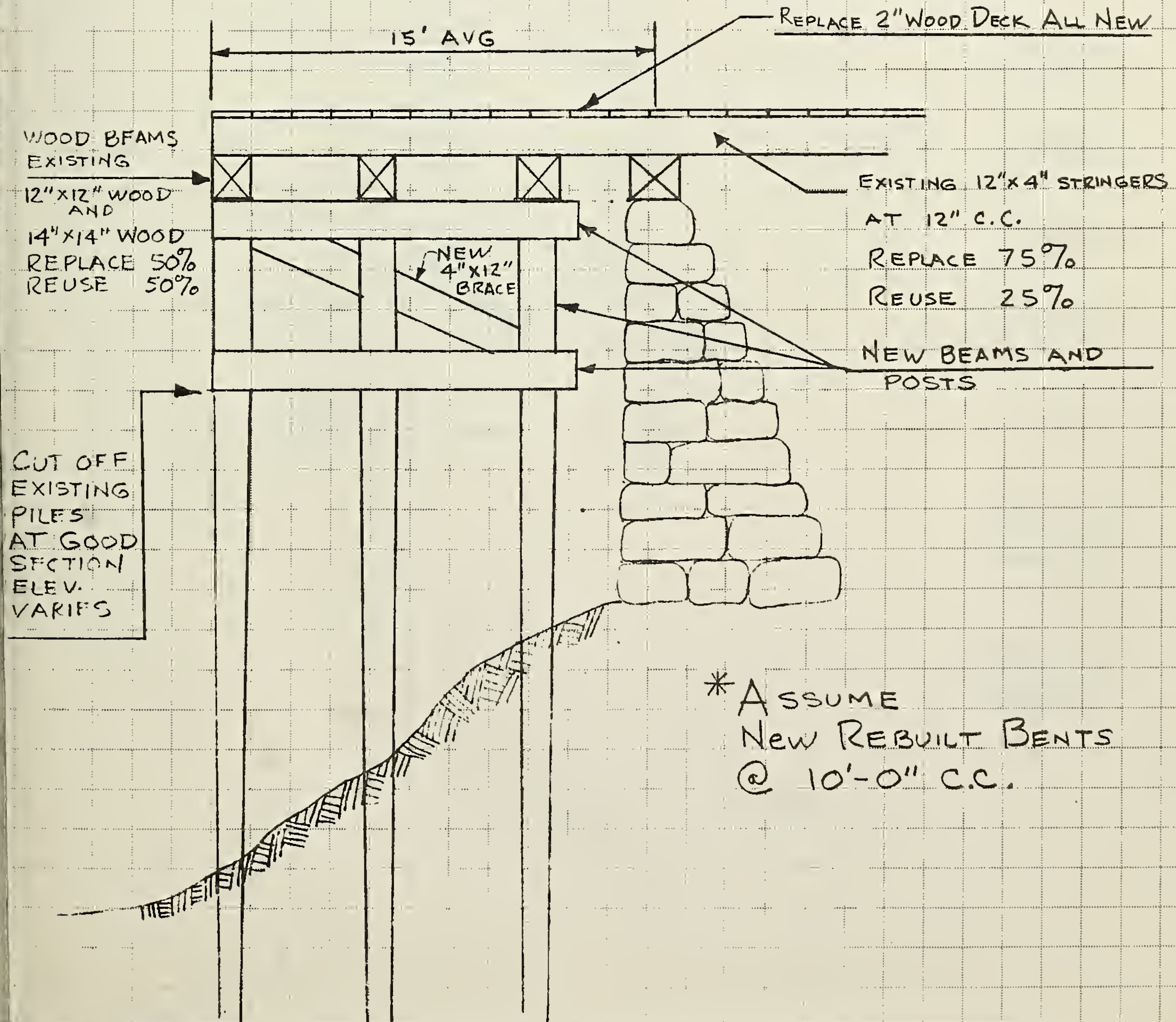
JOB Long Wharf Foundation Study
SHEET NO. OF Pg 112
CALCULATED BY JCD DATE 21 April 1976
CHECKED BY WAM DATE 22 April 1976
SCALE None

F. Recommendations and Estimated Costs

V Rebuild Outer Decks Utilizing Existing Piles

a. North Side - Area 12
b. South Side - Area 10
c. East Side - Area 11

Typical Section


Replace 2" Wood Deck All New
15' AVG
WOOD BEAMS EXISTING
12"x12" WOOD AND 14"x14" WOOD
REPLACE 50%
REUSE 50%
NEW 4"x12" BRACE
Existing 12"x4" stringers at 12" c.c.
Replace 75%
Reuse 25%
New beams and posts
Cut off existing piles at good section elev. varies

*Assume New Rebuilt Bents @ 10'-0" c.c.

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F. RECOMMENDATIONS AND ESTIMATED COSTS

V. Rebuild Outer Decks Utilizing Existing Piles

a. North Side - Area 12

Area Deck = 450 Ft. x 10 Ft. = 4500 S.F.

1. New 2" Wood Deck $9.00 \text{ MFBM} \times 900 \frac{\$}{\text{MFBM}}$ = \$ 8,100.00
2. New 4" x 12" Wood Stringers
   $337 \times .06 \frac{\text{MFBM}}{\text{Each}} \times 1300 \frac{\$}{\text{MFBM}}$ = 26,286.00
3. Reuse 4" x 12" Wood Stringers
   $113 \times .06 \frac{\text{MFBM}}{\text{Each}} \times 600 \frac{\$}{\text{MFBM}}$ = 4,068.00
4. New 12" x 12" Beams
   $2 \times 5.4 \frac{\text{MFBM}}{\text{Length}} \times 1300 \frac{\$}{\text{MFBM}}$ = 14,040.00
5. Reuse 12" x 12" Beams
   $2 \times 5.4 \frac{\text{MFBM}}{\text{Length}} \times 600 \frac{\$}{\text{MFBM}}$ = 5,400.00
6. New Beams and Posts at Bents 10' C.C.
   $45 \text{ Bents} \times .48 \frac{\text{MFBM}}{\text{Bent}} \times 1300 \frac{\$}{\text{MFBM}}$ = 28,080.00
7. Cut Off Piles
   $3 \frac{\text{Piles}}{\text{Bent}} \times 45 \text{ Bents} \times 20 \frac{\$}{\text{Pile}}$ = 2,700.00

\$88,674.00

Say Total = \$89,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

V. Rebuild Outer Decks Utilizing Existing Piles

b. South Side - Area 10

Area Deck = 860 Ft. x 15 Ft. = 12,900 S.F.

1.	New 2" Wood Deck 25.80 MFBM x 900 $\frac{\$}{\text{MFBM}}$	=	$ 23,220.00
2.	New 4" x 12" Wood Stringers 645 x .06 $\frac{\text{MFBM}}{\text{Each}}$ x 1300 $\frac{\$}{\text{MFBM}}$	=	50,310.00
3.	Reuse 4" x 12" Wood Stringers 215 x .06 $\frac{\text{MFBM}}{\text{Each}}$ x 600 $\frac{\$}{\text{MFBM}}$	=	7,740.00
4.	New 12" x 12" Beams 2 x 10.3 $\frac{\text{MFBM}}{\text{Length}}$ x 1300 $\frac{\$}{\text{MFBM}}$	=	26,780.00
5.	Reuse 12" x 12" Beams 2 x 10.3 $\frac{\text{MFBM}}{\text{Length}}$ x 600 $\frac{\$}{\text{MFBM}}$	=	12,360.00
6.	New Beams and Posts at Bents 10' C.C. 86 Bents x .48 $\frac{\text{MFBM}}{\text{Bent}}$ x 1300 $\frac{\$}{\text{MFBM}}$	=	53,664.00
7.	Cut Off Piles 3 $\frac{\text{Piles}}{\text{Bent}}$ x 86 Bents x 20 $\frac{\$}{\text{Pile}}$	=	5,160.00
			$179,234.00
	Say Total	=	$180,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

V. Rebuild Outer Decks Utilizing Existing Piles

c. East Side - Area 11

Area Deck = 240 Ft. x 20 Ft. = 4800 S.F.

1. New 2" Wood Deck $9.6 \text{ MFBM} \times 900 \frac{\$}{\text{MFBM}}$ = $ 8,640.00

2. New 4" x 12" Wood Stringers
$180 \times .08 \frac{\text{MFBM}}{\text{Each}} \times 1300 \frac{\$}{\text{MFBM}}$ = 18,720.00

3. Reuse 4" x 12" Wood Stringers
$60 \times .08 \frac{\text{MFBM}}{\text{Each}} \times 600 \frac{\$}{\text{MFBM}}$ = 2,880.00

4. New 12" x 12" Beams
$4 \times 2.9 \frac{\text{MFBM}}{\text{Length}} \times 1300 \frac{\$}{\text{MFBM}}$ = 15,080.00

5. Reuse 12" x 12" Beams
$4 \times 2.9 \frac{\text{MFBM}}{\text{Length}} \times 600 \frac{\$}{\text{MFBM}}$ = 6,960.00

6. New Beams and Posts at Bents 10' C.C.
$24 \text{ Bents} \times 0.84 \frac{\text{MFBM}}{\text{Bent}} \times 1300 \frac{\$}{\text{MFBM}}$ = 26,208.00

7. Cut Off Piles
$6 \frac{\text{Piles}}{\text{Bent}} \times 24 \text{ Bents} \times 20 \frac{\$}{\text{Pile}}$ = 2,880.00

$81,368.00

Say Total = $82,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

VI Fill Requirements and Costs

It is estimated that very little fill will be required during the rehabilitation of the site. Raising the grade of existing ground is not recommended because of additional lateral loads that would be induced into the existing granite block container walls. Some filling will be required in Area #8 in order to raise the grade to elevation +14 or +15. Additional minor filling may be necessary after old pavements are removed. In Area #1, it is not recommended that the hollow area under the existing deck be filled because of possible wall failure. Generally, existing final grade elevations should be maintained.

$$\text{Area \#8}\quad \frac{22{,}500\ \text{S.F.}\ \ \text{x}\ \ 2\ \text{Feet}}{27\ \text{C.F./C.Y.}}\ \ \text{x}\ \ 5.00\ \text{\$/C.Y.} = \text{\$}\ 8{,}333.33$$

$$\text{Area \#4}\quad \frac{79{,}800\ \text{S.F.}\ \ \text{x}\ \ 1\ \text{Foot}}{27}\ \ \text{x}\ \ 5.00\ \text{\$/C.Y.} = \text{\$}14{,}777.77$$

$23,111.10

Say Total Cost = $23,000.00

(See Drawing L, Page 104)

F. RECOMMENDATIONS AND ESTIMATED COSTS

VII Seawall Repairs and Costs

A visual inspection of the existing outer walls of Long Wharf was undertaken for purposes of this Report. The results of this inspection indicate that the granite block wall is in fairly good condition. There are no areas where the wall has failed nor are there areas where extensive settlement has occurred. The face of the wall appears to be in good alignment.

At the eastern end of the Wharf, there are three openings in the wall about 12 feet across which were once used to accommodate gangways to floating docks. They are no longer in use and have been built over. These three areas should be investigated in the future to determine if the seawalls abutting the voids have been undermined or are structurally unstable. At that time, a determination should be made regarding possible repair work. For the purposes of this Report, it is assumed that the three wall openings are sound and require no repair.

Major seawall repair and rebuilding should not be necessary. It will be necessary, during the construction phase, to remove and reset the top courses of granite blocks. This work should become necessary after the demolition phase and during the rebuilding of the outer wooden decks. It is practically impossible to put a dollar figure on this work

since it is dependent on how much the wall is disrupted during demolition and unknown conditions discovered once the deck is removed.

The assumption used to develop a dollar value is based on removing and resetting the upper-most single course of granite blocks around the entire perimeter of Long Wharf.

Length Top Seawall Outer Wall	=	1,840 Ft.
Length Top Seawall Inner Wall	=	720 Ft.
TOTAL		2,560 Ft.

Assume H of Block = 2 Ft.
Assume W of Block = 2 Ft.

$$V = 2\text{ Ft.} \times 2\text{ Ft.} \times 2{,}560\text{ Ft.} = 10{,}240\text{ C.F.}$$

Granite Blocks Removed and Reset

$$10{,}240\text{ C.F.} \times 8.00\,\frac{\$}{\text{C.F.}} = \$81{,}920.00$$

Say Total = $82,000.00

F. RECOMMENDATIONS AND ESTIMATED COSTS

VIII. Cost to Rebuild Area 1 Inner Deck Utilizing Existing Piles

a. Area 1 - East End Long Wharf - Hollow Deck Inside Seawall

The work shall consist of rebuilding the wood and concrete deck at the westerly end of Long Wharf. Each existing pile shall be hand excavated below the silt line until a full section of good pile is uncovered. The pile shall be cut off and an 18-inch concrete "Sono" tube with steel dowels connected. The existing wood stringers and beams shall be reconstructed, utilizing existing satisfactory members and some new timbers. A one-inch wood deck with three-inch concrete cover shall be placed as the surface course.

Factors for Estimating Cost

1. Deck area is 40,000 S.F.
2. 3" Concrete Deck with Welded Wire Fabric
3. 1" Treated Wood Sub-Deck - 100% New
4. 16" x 4" Stringers - Spa- 10' - Space 16" C.C.

   Estimated 500 New 16" x 4" x 10'-0"
   Estimated 1500 Reuse 16" x 4" x 10'-0"

5. 16" x 12" Beams - Pile Caps

   Estimated 70 New 12" x 16" x 20'
   Estimated 210 Reuse 12" x 16" x 20'

6. Piles Rows @ 10' C.C. Existing

   Spacing @ 5' C.C. Existing
   About 900 Piles

(See Drawing L, Page 104)

JOB Long Wharf Foundation Study

SHEET NO. ____ OF ____

SCHOENFELD ASSOCIATES, INC.
Consulting Engineers

CALCULATED BY JCD DATE 15 April 1976

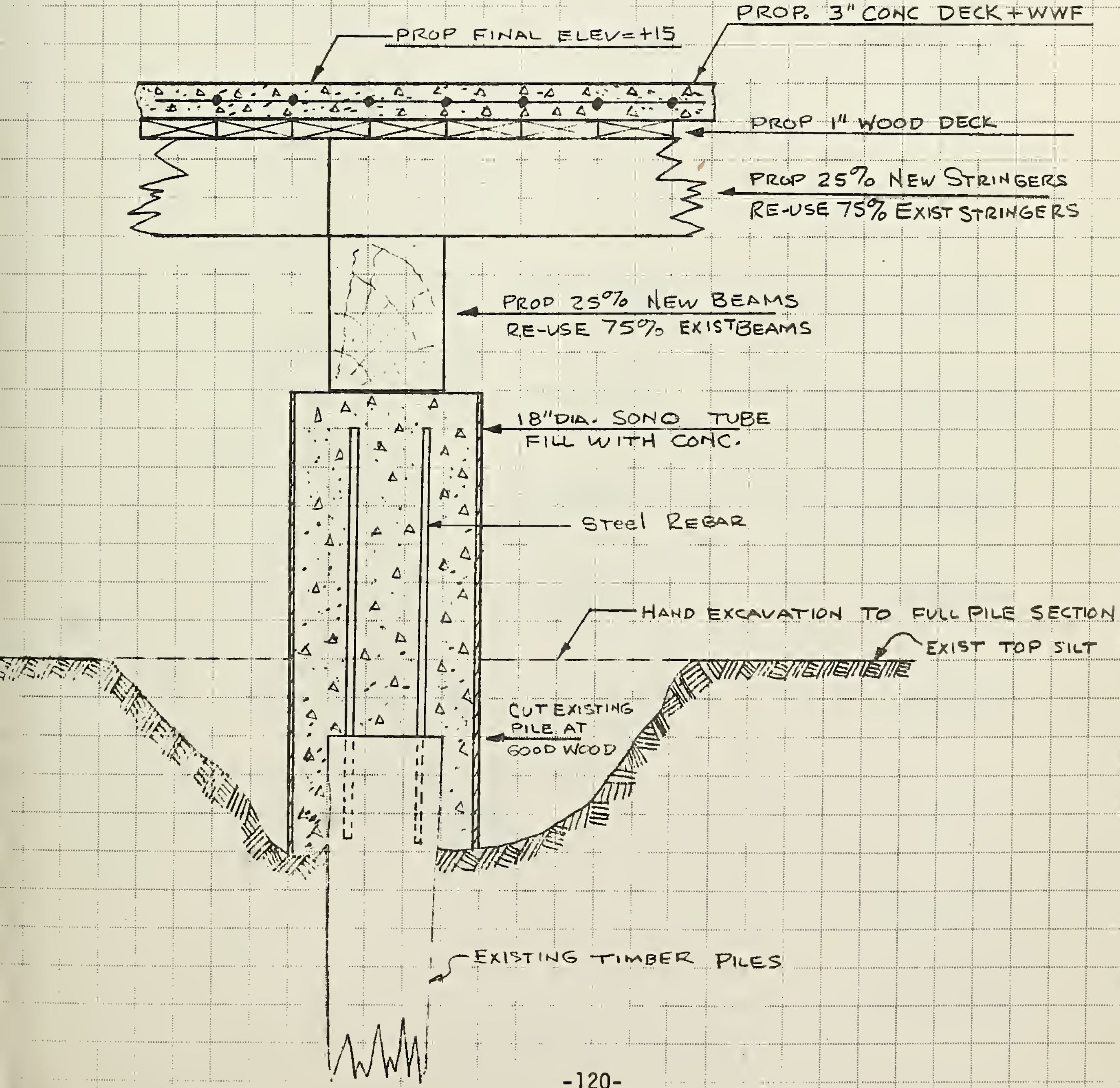
CHECKED BY WAM DATE 15 April 1976

SCALE None

F Recommendations and Estimated Costs

VIII Rebuild Area I Inner Deck

C. East Side - Inner Deck



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F. RECOMMENDATIONS AND ESTIMATED COSTS

VIII Cost to Rebuild Area 1 Inner Decks Utilizing Existing Piles

a. Area 1 - East End Long Wharf - Hollow Deck Inside Seawall

1.	New 3" Concrete Deck $\frac{40{,}000 \text{ S.F.} \times 0.25 \text{ Feet}}{27} \times 100 \frac{\$}{\text{C.Y.}}$	=	$ 37,037.04
2.	New 1" Wood Deck 40 MFBM $\times$ 900.00 $\frac{\$}{\text{MFBM}}$	=	36,000.00
3.	Welded Wire Fabric 40,000 S.F. $\times 2 \frac{\text{Lb.}}{\text{S.F.}} \times 0.25 \frac{\$}{\text{Lb.}}$	=	20,000.00
4.	New Wood Stringers $500 \times 0.054 \frac{\text{MFBM}}{\text{Each}} \times 1300. \frac{\$}{\text{MFBM}}$	=	35,100.00
5.	Reuse Wood Stringers $1500 \times 0.054 \frac{\text{MFBM}}{\text{Each}} \times 600 \frac{\$}{\text{MFBM}}$	=	48,600.00
6.	New Wood Beams $70 \times 0.32 \frac{\text{MFBM}}{\text{Each}} \times 1300 \frac{\$}{\text{MFBM}}$	=	29,120.00
7.	Reuse Wood Beams $210 \times 0.32 \frac{\text{MFBM}}{\text{Each}} \times 600 \frac{\$}{\text{MFBM}}$	=	40,320.00
8.	Hand Excavation $2 \frac{\text{C.Y.}}{\text{Pile}} \times 900 \text{ Pile} \times 12.00 \frac{\$}{\text{C.Y.}}$	=	21,600.00
9.	"Sono" Tubes Concrete Filled 900 Cols. $\times 100 \frac{\$}{\text{Each}}$	=	90,000.00
			$357,777.04
	Say Total Cost	→	$360,000.00

(See Drawing L, Page 104)

G. PROJECT PHASING, MOORING FACILITIES AND FIRE LANES

The Chart House Restaurant and the Custom House Building are presently occupied. Public and private utilities must be maintained during the construction phase of the work. One 12-inch diameter low service water main services the Wharf. This line supplies pressure for both domestic drinking water and fire protection. It is absolutely essential that this line be kept active during the construction phase of the work for obvious reasons.

Fire lanes around both buildings must be maintained at all times. The Contractor shall not be allowed to infringe upon these lanes.

Parking should be a major problem on Long Wharf when construction begins. The tenants of the buildings, the Chart House Restaurant customers, the Contractor's personnel, the boat owners and others all require parking space. If the hotel complex is under construction at the same time the Boston Redevelopment Authority has contracts underway on Long Wharf, the problem will be compounded. Sites that could be included to provide additional parking include: existing Atlantic Avenue between State Street and Central Street, and the existing parking lot on Parcel A-6 at the Aquarium Massachusetts Bay Transportation Authority Station. Both sites will prove to be unacceptable because the Atlantic Avenue site is usually saturated with buses using the New England Aquarium and Parcel A-6 is the site of the new hotel. Off-site parking is the only realistic answer to this problem.

Material storage is another major problem to be considered. Storage sites should take up a large portion of the existing parking areas on Long Wharf. These areas could also infringe on fire lanes and minimum parking facilities of the Wharf tenants and boat owners. Parking areas and material storage areas must be closely coordinated to avoid legal suits, etc.

Boat owners presently mooring their vessels around the Wharf must have temporary moorings during the course of construction. The present leases for mooring space are controlled by the Boston Redevelopment Authority. Several alternatives are available in this area:

1. The boats could acquire temporary mooring spaces at some other wharf or pier in Boston Harbor while work is underway.
2. Work could be completed on the south side of Long Wharf while the boats are temporarily moored on the north side. These locations could be reversed when the work on the south side is completed and work on the north side begins.
3. Large floating barges could be rented by the Boston Redevelopment Authority and attached to the east end of Long Wharf to provide temporary docking space during the construction.
4. Deep water, anchor and buoy mooring points could be located off the pier lines as necessary to provide space. This alternative is not recommended because small boats will be needed to get from ship to shore. The cruise ship owners would not find this an acceptable solution.

The normal method of reconstruction of the outer wooden decks around Long Wharf would be to use large barges to work from. It is very unlikely that all the work can be done from the shore side. The boats will have to be relocated in order for the work to be completed. This problem should be thoroughly considered in the planning.

H. PERMITS AND LICENSES

Generally speaking, when work is proposed in a tidal area a permit is required from various federal, state and local agencies. The United States Army Corps of Engineers and the Commonwealth of Massachusetts, Department of Public Works, Division of Waterways, were contacted for purposes of this Report.

It was indicated that any work proposed to improve, repair, modify, rebuild or construct new seawalls or rip-rapped slopes in the tidal areas around Long Wharf would require both permits and tideland licenses, as appropriate.

Several concerned agencies are listed below. This list could be expanded to other public and private groups, depending on the circumstances.

A. The United States Army Corps of Engineers
B. The Commonwealth of Massachusetts, Division of Waterways
C. The United States Environmental Protection Agency
D. The Boston Conservation Commission
E. The Commonwealth of Massachusetts, Department of Natural Resources, Wetlands Section
F. The Commonwealth of Massachusetts, Department of Public Health, Division of Conservation Services

The construction of new seawalls or new rip-rap slopes will require a normal tideland license. A public hearing is normally required by the Boston Conservation Commission and the State Division of Waterways. Approval is necessary from the other agencies listed above.

Demolition work and repair work normally would not require special permits from the above agencies unless the existing waterways are affected,

the quality of the water is changed, or filling of tidal areas occur. It will be necessary, however, to confirm this with the State Division of Waterways when a definite design is decided on.

Dredging operations require a tideland license from the Division of Waterways. The disposal of dredged materials is the responsibility of the Contractor doing the work. Disposal of dredged materials at sea can only be authorized by the United States Army Corps of Engineers and as approved by the United States Environmental Protection Agency.

J. RECOMMENDATIONS TO DEVELOPER

1. Prior to the start of any demolition or construction work on Long Wharf, the Massachusetts Bay Transportation Authority should be contacted. A survey of the existing tunnel conditions should be conducted with appropriate engineers of the Massachusetts Bay Transportation Authority, Boston Redevelopment Authority and the Developers. Photographs should should be taken, cracks and seepage points should be noted and any other conditions that could have bearing on possible future damage suits should be recorded. It is very important to work closely with the Massachusetts Bay Transportation Authority thru all phases of the work.

2. Pile driving will not be allowed in the vicinity of the tunnel so it is recommended that no new pilings be installed. Existing pilings should be cut off at low elevations and utilized to support new decks and piers.

3. The seawalls around Long Wharf should remain in relatively stable condition as long as additional filling behind the wall does not occur. Raising existing elevations of the new Wharf by filling will induce additional lateral loads on the wall, possibly causing failure.

4. The seawalls around Long Wharf were originally designed to withstand horizontal loadings. The Developer should not assume that the seawalls can be used as support for new structures. The seawalls can support the necessary deck structures but not additional vertical loadings. New structures should be supported by independent foundations not structurally connected to the seawalls.

5. The Developer should be aware that large quantities of granite block pavers exist on Long Wharf under the bituminous concrete pavers. These pavers can easily be incorporated in new designs as determined by the Architect-Developer. In any case, existing cobblestone should be removed and stacked to be used by the Boston Redevelopment Authority on Long Wharf or other appropriate projects.

6. All pilings that are determined to be unnecessary by the Engineer, are to be cut off at the mud line. No piles are to be extracted. If piles are pulled, voids will be created. As these voids close and the clay consolidates, movements in the abutting seawalls could occur.

7. The existing utilities that service Long Wharf should be adequate to service any new development. There is no high service water line on the Wharf. If high service water is required to provide additional fire protection, a new line will have to be laid. Provisions for future high service water have been made in that a stubbed line has been left in the new water system at Atlantic Avenue. The sanitary sewer and the low service water lines were installed recently and should be adequate. The gas, electric and telephone systems should be in good condition. All three systems have been either replaced or improved. Permits for this work were approved by this office and construction is complete. Storm drainage is designed to flow directly to the ocean. Some new storm drainage facilities will be necessary after the site design is complete.

8. The disposal of sanitary sewage waste into the Harbor from ships moored along Long Wharf is against the law. The Developer should be aware that future sanitary sewer laterals could be required to service these vessels.

Sewer laterals and ship hookups would not be required if the ship owners can prove that on-board sanitary waste is disposed of at other acceptable facilities. However, it is normal practice today to provide central sanitary disposal facilities at new marinas and yachting complexes.

9. It is highly recommended that future investigation be conducted to prove the configuration of the existing seawalls. The assumed wall section shown in Section D of this Report should be correct, but needs verification. Additional borings and an underwater diver are recommended.

10. The Developer should read Section E (II) of this Report closely regarding high tide levels in the area. This data is important in that trees, grass or shrubs could be negatively affected.

11. The use of explosives and blasting is strictly forbidden on Long Wharf. It shall not be allowed during the demolition phase or as may be required to alter the old Quincy Market Cold Storage Building foundation to accept the new hotel.

12. The Developer should be aware that dredging on the north side of Long Wharf will require several permits and public meetings. It is expected that obtaining a license and permit for off-site disposal of dredged material will be a time-consuming matter. The United States Environmental Protection Agency, the Army Corps of Engineers and the Commonwealth of Massachusetts Division of Waterways could delay proposed schedules.

13. It is recommended that a rip-rap slope be used at the northeast corner of the Wharf, Area 6, because of economical considerations.

14. In areas 3 and 7 in front of the Telephone Building, it is recommended that a new seawall be built in line with the seawall already constructed on East India Row to maintain the waterfront visual alignment. It is also recommended for consideration that the walkway around Central Wharf be extended northerly to Long Wharf and a stepped park be constructed similar to the East India Row Park. It is obvious that this is an expensive item, however, the overall architectural value of the area should be closely considered by the Master Planners of the Boston Redevelopment Authority before the seawall alternative is eliminated.

15. The Developer should be aware that construction costs in the Waterfront Area are normally well above recognized averages. Tidewaters, traffic congestion, parking areas, storage sites for materials and the intensity of underground utilities contribute to this factor.

16. The Developer should be aware that granite blocks are available on the site to construct the placed rip-rap slope in Area 6.

17. The Developer should be aware that fire lanes to the site must be maintainted. Public and private utility services must not be interrupted. Mooring and docking facilities must be coordinated to cause the least amount of disruption.

18. The Developer should be aware that an 80' wide easement exists on the north side of Long Wharf. (See Drawing A, Page 18)

19. If it is later determined that pilings are necessary in areas other than near the tunnel, predrilling will be necessary before driving.

Waterfront S465L

W Schoenfeld Assoc. Inc.

AUTHOR

Long Wharf Study.

TITLE

May 4, 1976